SOIL SURVEY OF

Colfax County, New Mexico

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
New Mexico Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1958–74. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1974. This survey was made cooperatively by the Soil Conservation Service and Forest Service, United States Department of Agriculture, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the Colfax Natural Resource Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Colfax County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit, woodland suitability group, and range site to which the soil has been assigned.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay on the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and the descriptions of the capability units, the range sites, and the woodland suitability groups.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife Habitat."

Ranchers and others can find, under "Range," groupings of the soil according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the section "Engineering."

Engineers and builders can find, under "Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Colfax County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "Environmental Features."

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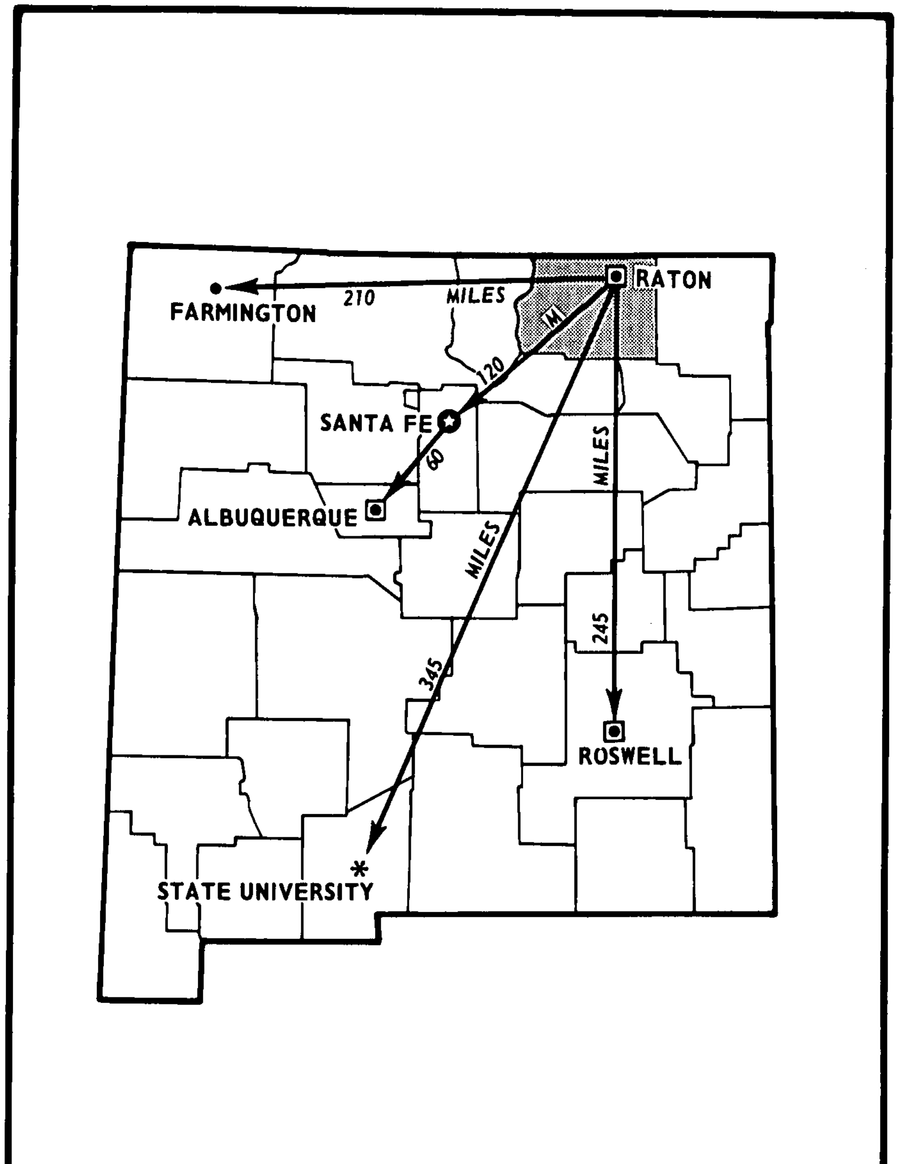

Location of Colfax County in New Mexico.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO

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United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with New Mexico Agricultural Experiment Station

COLFAX COUNTY (*9*) [2] is in the northeastern part of New Mexico (see facing page). The county has a total of 2,409,600 acres, or 3,765 square miles. It is nearly rectangular in shape with the long axis being east and west. Raton, the county seat, has a population of 6,962 according to the 1970 census.

The part of the county lying generally west of a line from Raton to Cimarron and then south to the county line is the Southern Rocky Mountain land resource area (*14*). This is a high, mountainous, and wooded area. Elevations range from about 6,500 feet to 12,580 feet on top of Little Costilla Peak. Much of this area is characterized by a rough and broken type of topography, including steep and very steep mountainsides, narrow ridgetops or mesas, deep canyons, and mountain valleys, of which the Moreno Valley is the largest. This mountainous area is used mainly for commercial woodland, range, wildlife habitat, and recreation. Precipitation ranges from about 14 inches at the lower elevations to about 30 inches at the highest elevation.

The part of the county lying east of this line is in the Great Plains land resource area. This is a plains area dominated by nearly level to rolling, grassed soils. Elevations range from about 5,500 feet, where the Canadian River crosses the south county line, to about 6,500 feet at the base of the mountains. There are some isolated mountain peaks and ranges of low hills scattered throughout this plains area. There is also a relatively extensive area of high mesas bounded by steep escarpments in the northeastern part of the county. The plains area is used mainly for range. Irrigated crops are grown in the vicinity of Maxwell, Springer, Miami, and Cimarron and dryland crops in the vicinity of Farley. Average annual precipitation ranges from about 14 to about 18 inches.

Colfax County is in the Colfax Natural Resource Conservation District, which is assisted by the Raton Field Office of the Soil Conservation Service in Raton, New Mexico.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Colfax County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rocks; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Angostura and Colmor, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Gruver clay loam, 0 to 3 percent slopes, eroded, is one of several phases within the Gruver series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

A mapping unit consists of all areas shown on a map that are identified by a common symbol. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent,

[1] Part of the fieldwork was done by MAX V. HODSON, DAVID L. CARTER, ROBERT STOCK, ARTHUR G. SHERRELL, JR., PARKER D. INGRAM, PAUL SHIELDS, and RONALD F. PAETZOLD, Soil Conservation Service; and J. OWEN CARLTON, Forest Service.

[2] Italic numbers in parentheses refer to Literature Cited, p. 185.

because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Three such kinds of mapping units are shown on the soil map of Colfax County: soil complexes, soil associations, and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Raton-Barela complex is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly from one another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Etoe-Etown association, steep, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Vermejo and Swastika soils, eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Riverwash is an example.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing medium for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this failure to slow permeability or a high water table. They see that streets, road pavements, and foundations for houses crack on a given kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their study and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

Soil Survey Intensities

Colfax County required soil surveys of two mapping intensities to meet the expected uses. The irrigated cropland located in the south-central part of the county, the dry cropland located in the southeastern part of the county, and the area in and adjacent to the city limits of Raton, New Mexico, required a high degree of detail to meet the present and expected needs. These areas were mapped using narrowly defined mapping units. The mapping units named as a phase of a soil series or as a complex are primarily narrowly defined mapping units.

The rest of Colfax County, where the soils are mainly used for range, woodland, recreation, and wildlife habitat, did not require the degree of detail necessary for narrowly defined mapping units. These areas were mapped using broadly defined mapping units. These mapping units are less homogeneous than the narrowly defined ones. Mapping units named as associations, undifferentiated groups, and land types are primarily broadly defined mapping units.

The "Guide To Mapping Units" at the back of this soil survey shows which mapping units are narrowly defined and which are broadly defined. The first letter of a soil symbol is always capitalized. In a broadly defined mapping unit, the second letter is also a capital. For example, Abreu-Cypher association, hilly (AB) and Aridic Argiustolls-Rock outcrop association, steep (ARF) are both broadly defined mapping units. In a narrowly defined mapping unit the second letter is a small letter. For example, La Brier silt loam (Lb) and Litle clay loam, 1 to 3 percent slopes (LtB) are both narrowly defined mapping units.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in an association can occur in other associations, but in different patterns.

A map showing soil associations (*6*) is useful to people who want to have a general idea of the soils in a survey area, who want to compare different parts of that area, or who want to locate large tracts that are

suitable for a certain kind of land use. Such a map is a useful general guide for broad planning on a watershed, a wooded tract, or a wildlife area or for broad planning of recreational facilities, community developments, and such engineering works as transportation corridors. It is not a suitable map for detailed planning for management of a farm or field or for selecting the exact location of a road or building or other structure, because the soils within an association ordinarily vary in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey area have been grouped into general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations are described on the following pages.

Deep, Well Drained, Level to Moderately Sloping, Warm Loamy Soils on Uplands

The soils in this group occupy uplands at elevations of 5,800 to 7,500 feet. They formed in alluvium and residuum derived from shale and in mixed eolian material. The plant cover is short grasses, mid grasses, and forbs. The soil associations in this group are in the north-central, central, south-central, and southeastern parts of the county.

1. *Colmor-Swastika association*

Level to moderately sloping silt loams and silty clay loams

This level to moderately sloping association is on uplands in the north-central, central, and south-central parts of the county. Slopes are smooth and range from 0 to 9 percent. The soils formed in residuum and alluvium derived from shale. The natural vegetation is blue grama, galleta, sand dropseed, and western wheatgrass. Elevations range from 5,800 to 7,500 feet. The average annual precipitation is 14 to 17 inches. Average annual soil temperature is 47° to 53° F. The frost-free season is 130 to 160 days.

This association makes up about 17 percent of the survey area. It is about 45 percent Colmor soils, 35 percent Swastika soils, 10 percent La Brier soils, and 10 percent Mion, Litle, Manzano, Vermejo, and Tinaja soils.

Colmor soils are in the smoother and flatter areas. Typically, they have a grayish brown silt loam and silty clay loam surface layer and a pale brown and light yellowish brown silty clay loam subsoil. The substratum is very pale brown silt loam and silty clay loam.

Swastika soils are on broad sloping uplands. They have a brown silt loam surface layer and a brown, pale brown, and light brownish gray silty clay subsoil. The substratum is light yellowish brown silty clay loam.

La Brier soils are on flats, swales, and uplands.

This association is used for range, irrigated cultivated crops, wildlife habitat, recreation, and watershed. The dominant crops are alfalfa, corn, and small grain. Range sites are generally large. Water supply is limited. The water sources are manmade lakes, stock tanks, and windmills. The main wildlife species are antelope, dove, and pheasant. The scattered lakes and tanks provide habitat for fish and waterfowl. The erosion hazard is slight to high. The hazard of soil blowing is slight to moderate.

2. *Gruver-Dalhart-Dioxice association*

Level to gently sloping and undulating fine sandy loams, loams, and clay loams

This level to gently sloping association is on uplands in the southeastern part of the county and in isolated areas on the northeast side of major drainageways. Slopes are smooth and range from 0 to 5 percent. The soils formed in mixed eolian materials. The natural vegetation is blue grama, sand dropseed, buffalograss, three-awn, fringed sagewort, yucca, and broom snakeweed. Elevations range from 5,800 to 7,000 feet. The average annual precipitation is 14 to 18 inches. The average annual soil temperature is 47° to 53° F. The frost-free season is 130 to 160 days.

This association makes up about 7 percent of the county. It is about 30 percent Gruver soils, 20 percent Dalhart soils, 15 percent Dioxice soils, 10 percent Dallam soils, 10 percent Seelez soils, and 15 percent Texline, Plack, Swastika, Litle, Tinaja, Manzano, and Tricon soils.

Gruver soils are on the smoother and flatter areas in the southeastern part of the county. Typically, they have a brown loam surface layer and a clay loam subsoil. The subsoil is brown to a depth of about 25 inches and reddish yellow, pinkish white, and pink below.

Dalhart soils are on uplands in isolated areas on the northeast side of major drainageways. They have a yellowish brown fine sandy loam surface layer and a yellowish brown and pale brown sandy clay loam subsoil. The substratum is pale brown sandy clay loam and fine sandy loam.

Dioxice soils are in the southeastern part of the county. They have a brown fine sandy loam surface layer and a yellowish brown, brown, and very pale brown loam and clay loam subsoil. The substratum is pink and brown loam and clay loam and has a high content of lime.

Dallam soils are on uplands in isolated areas on the northeast side of the major drainageways.

This association is used for range, dryland cultivated crops, wildlife habitat, and watershed. The dominant crops are grain sorghum, small grain, and corn (fig. 1). Water supply is limited. Water sources are stock tanks and windmills. The main wildlife species are antelope, dove, and some quail. The erosion hazard is slight or moderate. The hazard of soil blowing is moderate or high.

Deep to Very Shallow, Well Drained and Moderately Well Drained, Level to Hilly, Warm Loamy Soils on Uplands

The soils in this group occupy uplands, fans, swales, and low hills at elevations of 5,500 to 7,500 feet. They formed in alluvium and residuum derived from shale, sandstone, limestone, and basalt modified by mixed eolian materials. The plant cover is short grasses, mid grasses, and forbs. The soil associations in this group are in the south-central, central, northeastern, eastern, and southeastern parts of the county.

Figure 1.—**Area of Gruver-Dalhart-Dioxice association. Grain sorghum is on Dallam fine sandy loam, 0 to 3 percent slopes.**

3. *Mion-Vermejo-Litle association*

Shallow to deep, well drained and moderately well drained, level to hilly silt loams and silty clay loams

This level to hilly association occupies uplands, fans, swales, and low hills in the central, north-central, and south-central parts of the county. Slopes range from 0 to 25 percent. The soils formed in residuum and alluvium derived from shale. The natural vegetation is blue grama, buffalograss, alkali sacaton, inland saltgrass, western wheatgrass, galleta, sideoats grama, four-wing saltbush, scattered pinyon pine, and one-seed juniper. Elevations range from 5,800 to 7,500 feet. The average annual precipitation is 14 to 17 inches. Average annual soil temperature is 47° to 55° F. The frost-free season is 120 to 160 days.

This association makes up about 12 percent of the survey area. It is about 22 percent Mion soils, 20 percent Vermejo soils, 14 percent Litle soils, 10 percent Manzano soils, and 34 percent Colmor, Penrose, Tinaja, Berthoud, Swastika, and Seelez soils and Rock outcrop and Riverwash.

Mion soils are on hills and smooth uplands. Typically, they have a light brownish gray silt loam surface layer. The next layer is pale brown silty clay. Shale is at a depth of 14 inches.

Vermejo soils are on fans and in swales. They have a grayish brown silty clay loam surface layer. The next layer is grayish brown silty clay. The substratum is grayish brown silty clay with salt mycelia and crystals.

Litle soils are on uplands. They have a grayish brown silt loam surface layer and a grayish brown clay subsoil. The substratum is grayish brown clay. Shale is at a depth of 23 inches.

Manzano soils are on valley floors and in swales.

This association is used for range, irrigated cultivated crops, wildlife habitat, recreation, and watershed. Cultivated crops are affected by soluble salts, slow permeability, and the shallowness of the soil over rock. The dominant crops are alfalfa and corn. Water supply is limited. Water sources are streams, manmade lakes, stock tanks, and windmills. The dominant wildlife species are antelope, dove, and pheasant. The streams, lakes, and tanks provide habitat for fish and waterfowl. The erosion hazard is high. The hazard of soil blowing is moderate or high. The soils of this association are a potential source of sediment.

4. *Capulin-Torreon association*

Deep, well drained, level to gently rolling silt loams

This level to gently rolling association (fig. 2) is on basalt flows in the eastern half of the county. Slopes range from 0 to 7 percent. The soils formed in residuum and alluvium derived from basalt. The natural vegeta-

Figure 2.—**Area of Capulin-Torreon association. Capulin and Torreon soils are in the foreground. Apache and Ayon soils are in the more sloping, cobbly areas.**

tion is blue grama, buffalograss, ring muhly, little bluestem, sideoats grama, western wheatgrass, fringed sagewort, and broom snakeweed. Elevations are 6,000 to 7,500 feet. The average annual precipitation is 14 to 17 inches. Average annual soil temperature is 47° to 55° F. The frost-free season is 130 to 160 days.

This association makes up about 10 percent of the county. It is about 20 percent Capulin soils, 15 percent Torreon soils, 10 percent Ayon soils, 10 percent Apache soils, 10 percent Deacon soils, and 35 percent Des Moines, Oro Grande, La Brier, Thunderbird, Bandera, Plack, and Tafoya soils, Rock outcrop, and Cinder land.

Capulin soils are on fans. Typically, they have a dark grayish brown silt loam and silty clay loam surface layer and a grayish brown and light brownish gray clay loam subsoil. The substratum is very pale brown and light gray clay loam and silty clay loam.

Torreon soils are on broad fans. They have a brown silt loam and silty clay loam surface layer and a brown and pale brown clay, silty clay loam, and silty clay subsoil. The substratum is white clay loam.

Ayon soils and Apache soils are on basalt flows. Deacon soils are on uplands.

This association is used for range, wildlife habitat, recreation, and watershed. Water sources are stock tanks, windmills, and scattered pothole lakes. The dominant wildlife species are antelope and dove. The tanks and lakes provide habitat for ducks. Some ponds and lakes have been privately stocked with fish. The erosion hazard is moderate. The hazard of soil blowing is slight or moderate.

5. *Travessilla-Carnero-Partri association*

Very shallow to deep, well drained, level to hilly stony loams, fine sandy loams, loams, and silt loams

This level to hilly association is on uplands and brushy slopes in the southeastern part of the county. Slopes range from 0 to 30 percent in most areas, but range to 75 percent in some areas. The soils formed in alluvium and residuum derived from sandstone and modified by mixed eolian materials. The natural vegetation is blue grama, hairy grama, sand dropseed, sideoats grama, big bluestem, little bluestem, three-awn, wolftail, pinyon pine, and one-seed juniper. Elevations are 5,500 to 7,000 feet. The average annual precipitation is 14 to 17 inches. The average annual soil temperature is 47° to 55° F. The frost-free season is 130 to 180 days.

This association makes up about 2 percent of the

county. It is about 25 percent Travessilla soils, 20 percent Carnero soils, 15 percent Partri soils, 15 percent Bernal soils, and 25 percent Dioxice, La Brier, Manzano, Litle, Colmor, and Plack soils, Rubble land, and Rock outcrop.

Travessilla soils are on ridges, hillsides, and benches. Typically, they have a brown stony loam or fine sandy loam surface layer that is underlain by brown loam. Sandstone is at a depth of 11 inches.

Carnero soils are on uplands. They have a grayish brown loam surface layer, and a brown and yellowish brown clay loam and clay subsoil. Sandstone is at a depth of 38 inches.

Partri soils are on uplands. They have a dark grayish brown silt loam surface layer and a dark grayish brown and brown silty clay loam and silty clay subsoil. The substratum is brown clay loam.

Bernal soils are on ridges. They have a brown loam surface layer and a brown sandy clay loam subsoil. Sandstone is at a depth of 18 inches.

These soils are used for range, wildlife habitat, recreation, and watershed. Water sources are streams, stock tanks, windmills, and scattered pothole lakes. The dominant wildlife species are antelope, deer, Barbary sheep, dove, and quail. The Canadian River provides habitat for warm water fish and waterfowl. The pothole lakes are used by waterfowl. The erosion hazard is moderate or high. The hazard of soil blowing is moderate.

Deep to Very Shallow, Well Drained, Level to Strongly Sloping, Cold Loamy Soils on Uplands

The soils in this group occupy mesas and mountain valleys at elevations of 7,200 to 11,000 feet. They formed in alluvium and residuum derived from basalt, sedimentary rocks, and intrusive rocks modified by mixed eolian materials. The plant cover is short grasses, mid grasses, and forbs. The soil associations in this group are in the northeastern, western, and southwestern parts of the county.

6. Raton-Barela association

Very shallow and deep, level to strongly sloping stony silt loams, cobbly loams, and silt loams

This association is on basalt-capped mesas in the northeastern and southwestern parts of the county. Slopes range from 0 to 50 percent but are mostly 0 to 15 percent. The soils formed in residuum and alluvium derived from basalt and modified by mixed eolian materials. The natural vegetation is blue grama, Arizona fescue, western wheatgrass, mountain muhly, pine dropseed, prairie junegrass, big bluestem, and little bluestem. Elevations are 7,200 to 10,000 feet. The average annual precipitation is 15 to 20 inches. The average annual soil temperature is 42° to 47° F. The frost-free season is 80 to 120 days.

This association makes up about 5 percent of the county. It is about 35 percent Raton soils, 20 percent Barela soils, 10 percent Hillery soils, 10 percent Yankee soils, and 25 percent Dalcan, Saladon, Burnac, and Bandera soils and Rock outcrop.

Raton soils are on basalt flows. Typically, they have a very dark grayish brown stony silt loam or cobbly loam surface layer over a brown very stony clay or very cobbly loam subsoil. Basalt is at a depth of 15 inches.

Barela soils are on basalt mesas. They have a dark gray silt loam surface layer. The subsoil is brown, grayish brown, and dark grayish brown silty clay loam, silty clay, and stony clay. Basalt is at a depth of 41 inches or more.

Hillery soils are on basalt flows mainly in the southwestern part of the county.

Yankee soils are on basalt mesas.

This association is used for range, limited cultivated crops, wildlife habitat, recreation, and watershed. The main crops are small grain and alfalfa. Water sources are pothole lakes, stock tanks, and windmills. The dominant wildlife species are antelope, deer, elk, and dove. The lakes provide a habitat for fish and waterfowl. The erosion hazard is moderate or high. The hazard of soil blowing is slight or moderate.

7. Morval-Moreno-Brycan association

Deep, level to strongly sloping clay loams and loams

This gently sloping to moderately steep association is in mountain valleys in the western part of the county. Slopes range from 0 to 30 percent but in most areas are 0 to 15 percent. The soils formed in alluvium derived from intrusive and sedimentary rocks. The natural vegetation is blue grama, mountain muhly, bottlebrush squirreltail, Kentucky bluegrass, western wheatgrass, and Arizona fescue. Elevations are 8,000 to 9,000 feet. The average annual precipitation is 16 to 18 inches. The average annual soil temperature is 44° to 47° F. The frost-free season is less than 90 days.

This association makes up about 2 percent of the county. It is about 25 percent Morval soils, 22 percent Moreno soils, 18 percent Brycan soils, 10 percent Frolic soils, and 25 percent Ring, Cypher, Vamer, Dargol, and Saladon soils, Rubble land, Rock outcrop, and Cumulic Haplaquolls.

Morval soils are in wide mountain valleys. Typically, they have a brown clay loam surface layer. The subsoil is a brown and light brown clay loam and silty clay loam. The substratum is pink silty clay loam.

Moreno soils are on valley sides. They have a brown loam and sandy clay loam surface layer. The subsoil is reddish brown clay loam and gravelly clay. The substratum is reddish brown gravelly clay.

Brycan soils are on valley sides and alluvial fans. They have a brown loam surface layer and a brown loam and sandy clay loam subsoil. The substratum is brown and yellowish brown sandy clay loam and clay loam.

Frolic soils are on fans and in swales.

This association is used for range, cultivated crops, wildlife habitat, recreation, and watershed. The main crops are alfalfa and small grain. The main wildlife species are elk, deer, bear, and turkey. Water sources are streams, springs, lakes, and stock tanks. The streams, lakes, and stock tanks provide habitat for fish and waterfowl. The erosion hazard is slight or moderate. The hazard of soil blowing is slight.

Deep to Very Shallow, Well Drained and Excessively Drained, Nearly Level to Very Steep, Cold and Warm Loamy Soils on Uplands and Rock Outcrop

The soils in this group occupy mesas, mountainsides, and mountaintops at elevations of 6,000 to 12,000 feet. They formed in colluvium, alluvium, and residuum derived from sandstone, shale, limestone, basalt, and intrusive rocks. The plant cover is conifers, grass, and brush. The soil associations in this group are in the northern and western parts of the county.

8. Bundo-Angostura-Tolby association

Deep, well drained and excessively drained, moderately steep to very steep, cold gravelly sandy loams, stony sandy loams, stony fine sandy loams, and stony loams

This association is on wooded mountainsides (fig. 3) in the western part of the county. Slopes are mainly 20 to 60 percent. The soils formed in colluvium, alluvium, and residuum derived from intrusive rocks and sandstone and shale. The natural vegetation is Douglas-fir, white fir, Engelmann spruce, subalpine fir, bristlecone pine, and quaking aspen. The understory is kinnikinnick, oregongrape, mockorange, and mountain grasses. Elevations are 8,000 to 12,000 feet. The average annual precipitation is 22 to 30 inches. The average annual soil temperature is 34° to 42° F. The frost-free season is less than 90 days.

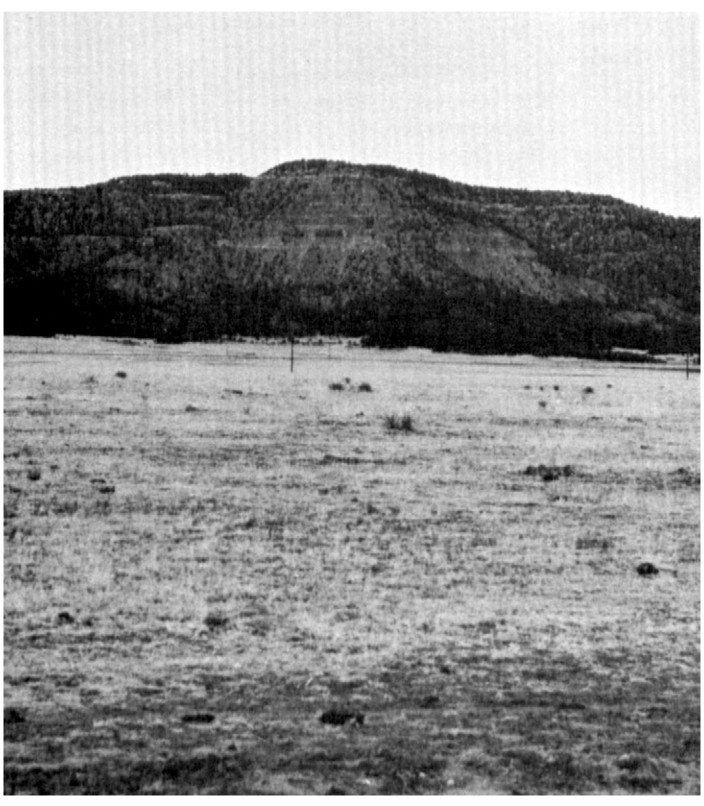


Figure 3.—Area of Bundo-Angostura-Tolby association as seen from Ute Park.

This association makes up about 8 percent of the county. It is about 25 percent Bundo soils, 20 percent Angostura soils, 10 percent Tolby soils, 10 percent Cypher soils, 5 percent Etoe soils, and 30 percent Etown, Wellsville, Abreu, Moreno, Morval, and Saladon soils, Rock outcrop, and a group of soils called Ustochrepts.

Bundo soils are on mountainsides toward the lower half of the elevation range. Typically, they have a light gray gravelly sandy loam surface layer that is covered by a layer of decaying forest litter. The subsurface layer is a light gray gravelly sandy loam. The subsoil is a light yellowish brown gravelly loam and very gravelly sandy clay loam.

Angostura soils are on mountainsides at the higher end of the elevation range. They have a light brownish gray stony loam surface layer that is covered by a layer of decaying forest litter. The subsoil is a light yellowish brown stony sandy clay loam.

Tolby soils are on mountainsides at the higher elevations. They have a grayish brown stony loam surface layer that is covered by a layer of decaying forest litter. The subsoil is a pale brown very gravelly loam. The substratum is a brown, yellowish brown, and pale brown cobbly loam, sand, gravelly loamy sand, and cobbly sandy loam.

Cypher soils are on mountainsides and ridge crests toward the lower half of the elevation range.

This association is used for woodland, wildlife habitat, recreation, and watershed. Water sources are streams, seeps, springs, and stock tanks. The dominant wildlife species are elk, bear, deer, turkey, squirrel, cougar, Bighorn sheep, beaver, grouse, and bandtailed pigeon. The streams and tanks provide habitat for fish and waterfowl. The erosion hazard is moderate or high, and the hazard of soil blowing is slight.

9. Burnac-Fuera association

Deep, well drained, nearly level to very steep, cold stony loams and cobbly loams

This sloping to very steep association occupies basalt flows and mountainsides in the southwestern part of the survey area. Slopes range from 1 to 60 percent. The soils formed in colluvium, alluvium, and residuum derived from basalt sandstone and shale. The natural vegetation is Douglas-fir, white fir, limber pine, quaking aspen, Engelmann spruce, and ponderosa pine. The understory is Gambel oak and mountain grasses. Elevations are 7,500 to 11,000 feet. The average annual precipitation is 22 to 27 inches. The average annual soil temperature is 42° to 44° F. The frost-free season is less than 90 days.

This association makes up about 3 percent of the county. It is about 55 percent Burnac soils, 20 percent Fuera soils, and 25 percent Hillery, Saladon, Raton and Brycan soils, Rock outcrop, and Rubble land.

Burnac soils are on broad basalt flows. Typically, they have a very dark grayish brown stony loam surface layer that is covered by a layer of decaying forest litter. The subsurface layer is a brown stony loam. The subsoil is a brown and reddish brown clay

and clay loam. The substratum is a reddish brown gravelly sandy clay. Basalt is at a depth of 53 inches.

Fuera soils are on mountainsides. They have a dark grayish brown and pale brown cobbly loam surface layer that is covered by a layer of decaying forest litter. The subsurface layer is a very pale brown cobbly loam. The subsoil is a brown cobbly and very cobbly clay. The substratum is a brown and yellowish brown very cobbly and very stony clay.

This association is used for woodland, wildlife habitat, recreation, and watershed. The dominant wildlife species are elk, deer, bear, turkey, beaver, squirrel, and cougar. Water sources are streams and a few small lakes, which provide habitat for fish and waterfowl. The soil erosion hazard is moderate or high. The soil blowing hazard is slight.

10. Dargol-Fuera-Vamer association

Very shallow to deep, well drained, nearly level to very steep, cold stony loams, stony very fine sandy loams, and cobbly loams

This association occupies mesas and mountainsides in the northern part of the county. Slopes range from 1 to 60 percent. The soils formed in colluvium, alluvium, and residuum derived from sandstone and shale. The natural vegetation is Douglas-fir, white fir, ponderosa pine, pinyon pine, Rocky Mountain juniper, and one-seed juniper. The understory is Gambel oak, mountain-mahogany, mountain muhly, pine dropseed, big bluestem, little bluestem, blue grama, and sideoats grama. Elevations are 7,000 to 9,000 feet. The average annual precipitation is 18 to 22 inches. The average annual soil temperature is 42° to 46° F. The frost-free season is from 90 to 120 days.

This association makes up about 28 percent of the county. It is about 20 percent Dargol soils, 15 percent Fuera soils, 15 percent Vamer soils, 10 percent Midnight soils, 10 percent Rombo soils, and 30 percent Ponil, Deacon, Stout, La Brier, Manzano, Oro Grande, Mughouse, Meloche, and Laporte soils, Rock outcrop, and Rubble land.

Dargol soils are on mesa tops and mountainsides. Typically, they have a very pale brown stony loam surface layer that is covered by a layer of decaying forest litter. The subsoil is a reddish yellow and light yellowish brown clay. Sandstone is at a depth of 35 inches.

Fuera soils are on mountainsides. They have a dark grayish brown and pale brown cobbly loam surface layer that is covered by a layer of decaying forest litter. The subsurface layer is a very pale brown cobbly loam. The subsoil is a brown cobbly and very cobbly clay. The substratum is brown cobbly clay and yellowish brown very stony clay.

Vamer soils are on mesa tops and ridges. They have a grayish brown stony very fine sandy loam surface layer and a brown clay subsoil. Sandstone is at a depth of 16 inches.

Midnight soils and Rombo soils are on mountainsides.

This association is used for woodland, range, wildlife habitat, recreation, and watershed. The dominant wildlife species are elk, deer, turkey, bear, beaver, squirrel, and cougar. Water sources are streams, lakes, windmills, and stock tanks. The streams and lakes provide habitat for fish and waterfowl. The erosion hazard is moderate or high. The hazard of soil blowing is slight.

11. Aridic Argiustolls-Rock outcrop association

Shallow to deep, well drained, moderately steep to very steep, warm soils and Rock outcrop

This moderately steep to steep association is on side slopes of basalt mesas in the northeastern and southwestern parts of the county. Slopes range from 20 to 55 percent. The soils formed in colluvium, alluvium, and residuum derived from sandstone, shale, limestone, and basalt. The natural vegetation is blue grama, western wheatgrass, Arizona fescue, little bluestem, Gambel oak, mountainmahogany, pinyon pine, one-seed juniper, and scattered ponderosa pine. Elevations are 6,000 to 8,200 feet. The average annual precipitation is 14 to 19 inches. The average annual soil temperature is 47° to 53° F. The frost-free season is 120 to 160 days.

This association makes up about 6 percent of the county. It is 80 percent Aridic Argiustolls, 15 percent Rock outcrop, and 5 percent Burnac, Fuera, Raton, Deacon, Mion, Apache, and Ayon soils and Rubble land.

The extremely variable Aridic Argiustolls range from stony to nonstony and from deep to shallow throughout the association.

Rock outcrop is made up of basalt, sandstone, shale, and limestone. It is on nearly vertical escarpments at the higher elevations and on ridges and isolated exposures throughout the association.

This association is used for range, wildlife habitat, recreation, and watershed. Water sources are intermittent streams, springs, stock tanks, and windmills. The dominant wildlife species are deer, elk, turkey, bear, and dove. The erosion hazard is high. The hazard of soil blowing is slight.

Descriptions of the Soils

This section describes the soil series and mapping units in Colfax County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series also holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for dry soil unless othewise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit.

Unless otherwise noted, the pH was determined with colorimetric indicators by using soil and water in a ratio of 1 to 5. No mention of features such as wet consistence, roots, rock fragments, and carbonates in the description of a horizon indicates that the feature was absent.

As mentioned in the section, "How This Survey Was Made," not all mapping units are members of a soil series. Rock outcrop and Riverwash, for example, do not belong to a soil series, but nevertheless, are listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is a symbol. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability classification, range site, and woodland suitability group in which the mapping unit has been placed. The page for the description of each capability unit, range site, woodland suitability group, or other interpretative group can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*12*).

Abreu Series

The Abreu series consists of deep, well drained soils on mountain foot slopes and at the lower end of mountain side slopes. These soils formed in residuum derived from igneous rock. Slopes are 10 to 30 percent. Elevation is 7,500 to 8,500 feet. The vegetation is ponderosa pine, Douglas-fir, white fir, Rocky Mountain juniper, Gambel oak, quaking aspen, Arizona fescue, mountain muhly, kinnikinnick, and prairie junegrass. Precipitation is 22 to 25 inches, the mean annual soil temperature is about 44° F, and the frost-free season is 90 to 120 days.

In a representative profile, the surface layer is grayish brown gravelly loam about 3 inches thick. It is covered with about 2 inches of decomposing forest litter. The subsurface layer is light brownish gray very gravelly loam about 12 inches thick. The subsoil is brown gravelly and very gravelly clay loam about 28 inches thick. Igneous bedrock is at a depth of 43 inches. The soil is medium acid in the surface layer and slightly acid below.

The soil is moderately slowly permeable. Available water capacity is 3 to 6 inches. Effective rooting depth is 40 to 60 inches.

Abreu soils are used for wildlife habitat, recreation, woodland, and watershed.

Representative profile of Abreu gravelly loam in an area of Abreu-Cypher association, hilly, about 8 miles west northwest of Philmont Scout Ranch headquarters; 3,000 feet north and 1,400 feet west of Cimarroncito Camp:

O1&O2—2 inches to 0; decomposed and decomposing forest litter.

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak very fine granular structure; soft dry, very friable moist, slightly sticky and slightly plastic wet; many very fine and fine and few coarse roots; many interstitial pores; 30 percent angular gravel; medium acid; clear wavy boundary.

A2—3 to 15 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine and few coarse roots; many fine tubular pores; 55 percent angular gravel; slightly acid; clear wavy boundary.

B21t—15 to 30 inches; brown (7.5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; few patches of pale brown (10YR 6/3) A2 material, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; very hard dry, firm moist, sticky and plastic wet; few fine medium and coarse roots; common fine tubular pores; common moderately thick clay films on peds and gravel; 45 percent angular gravel; slightly acid; gradual wavy boundary.

B22t—30 to 43 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard dry, firm moist, sticky and plastic wet; very few roots, common fine tubular pores; many moderately thick clay films on peds and gravel; 60 percent angular gravel; slightly acid; abrupt wavy boundary.

R—43 inches; igneous bedrock fractured in the upper few inches.

Rock fragments are angular pebbles 1/8 inch to 1 inch in diameter. The A1 horizon is gravelly loam or gravelly sandy loam that is 15 to 30 percent rock fragments. The A2 horizon has value of 6 or 7 dry and 4 or 5 moist and chroma of 2 through 4. It is gravelly loam, gravelly sandy loam, or very gravelly loam that is 40 to 60 percent rock fragments. The B2t horizon has hue of 7.5YR or 10YR. It is gravelly clay loam, gravelly sandy clay loam, or very gravelly clay loam that is 40 to 70 percent rock fragments. The depth to bedrock ranges from 40 to 60 inches. The bedrock is acid igneous and is fractured in the upper 4 to 6 inches.

AB—Abreu-Cypher association, hilly. This mapping unit is on all aspects of the lower lying mountain foot slopes at elevations of 7,500 to 8,500 feet. It is about 60 percent an Abreu gravelly loam that has 10 to 30 percent slopes and about 30 percent a Cypher gravelly loam that has 15 to 35 percent slopes. The Abreu soil is in the smoother, lower positions. The Cypher soil is on the ridgetops and in the more sloping positions.

About 10 percent of this mapping unit is included areas of Bundo, Brycan, and Frolic soils, Rock outcrop, and Rubble land. The Bundo soil is in the higher positions. Brycan and Frolic soils are in the small grassed swales. Rock outcrop occurs throughout the association. Rubble land is below Rock outcrop.

Abreu gravelly loam has the profile described as

TABLE 1.—*Acreage and proportionate extent of the soils*

Map symbol	Soil name	Acres	Percent
AB	Abreu-Cypher association, hilly	4,139	0.2
AG	Angostura association, steep	6,599	0.3
AN	Angostura-Tolby association, steep	59,694	2.5
ApD	Apache-Ayon complex, 1 to 9 percent slopes	40,563	1.7
ARF	Aridic Argiustolls-Rock outcrop association, steep	133,326	5.5
ARG	Aridic Argiustolls-Rock outcrop complex, very steep	17,479	0.7
BA	Bandera association	2,633	0.1
BE	Barela-Yankee association	27,422	1.1
BhD	Berthoud loam, 3 to 9 percent slopes	6,710	0.3
BR	Brycan association, moderately sloping	7,386	0.3
BU	Bundo association, steep	40,457	1.7
BY	Burnac-Hillery association, sloping	39,870	1.7
CaD	Capulin-Ayon complex, 1 to 9 percent slopes	11,936	0.5
CB	Capulin-Torreon association, moderately sloping	75,816	3.1
CP	Carnero-Partri association	23,647	1.0
CrB	Colmor silt loam, 1 to 3 percent slopes	3,014	0.1
CrC	Colmor silt loam, 3 to 5 percent slopes	12,546	0.5
CsB	Colmor silty clay loam, 1 to 3 percent slopes	5,204	0.2
CsC	Colmor silty clay loam, 3 to 5 percent slopes	971	([1])
CT	Colmor association	190,543	7.9
CV	Colmor-Vermejo-Litle association, sloping	45,742	1.9
CY	Cypher-Bundo association, steep	32,041	1.3
DaB	Dalhart fine sandy loam, 1 to 3 percent slopes	3,389	0.1
DaC	Dalhart fine sandy loam, 3 to 5 percent slopes	553	([1])
DB	Dalhart-Seelez association, gently sloping	45,969	1.9
DmB	Dallam loamy fine sand, 0 to 3 percent slopes	2,488	0.1
DmC2	Dallam loamy fine sand, 1 to 5 percent slopes, eroded	1,989	0.1
DnB	Dallam fine sandy loam, 0 to 3 percent slopes	15,901	0.7
DnB2	Dallam fine sandy loam, 0 to 3 percent slopes, eroded	3,852	0.2
DO	Dargol-Stout-Vamer association, sloping	69,277	2.9
DP	Deacon-Ayon association, sloping	24,950	1.0
DR	Deacon-La Brier-Manzano association, sloping	49,805	2.1
DsE	Deacon-Oro Grande-Laporte complex, 3 to 15 percent slopes	8,893	0.4
DT	Des Moines association, steep	12,893	0.5
DxC	Dioxice fine sandy loam, 1 to 5 percent slopes	22,157	0.9
DxC2	Dioxice fine sandy loam, 1 to 5 percent slopes, eroded	3,666	0.1
EE	Etoe-Etown association, steep	19,041	0.8
FC	Frolic association, gently sloping	7,044	0.3
FD	Fuera-Burnac association, steep	22,512	0.9
FE	Fuera-Dargol-Vamer association, steep	312,304	13.0
GaB	Gruver fine sandy loam, 0 to 3 percent slopes	5,507	0.2
GbB	Gruver loam, 0 to 3 percent slopes	40,254	1.7
GcB2	Gruver clay loam, 0 to 3 percent slopes, eroded	11,168	0.5
HrD	Hillery stony loam, 1 to 7 percent slopes	17,247	0.7
Lb	La Brier silt loam	47,565	2.0
Lc	La Brier silty clay loam, saline	3,848	0.2
Lr	La Brier-Rock outcrop complex	12,447	0.5
LSF	Laporte channery loam, 5 to 35 percent slopes	6,134	0.3
LtB	Litle clay loam, 1 to 3 percent slopes	8,128	0.3
Ma	Manzano loam	6,638	0.3
MB	Manzano association, gently sloping	23,399	1.0
Mn	Midnight-Rombo-Rock outcrop complex	152,785	6.3
MoB	Mion silty clay loam, 1 to 3 percent slopes	1,351	0.1
Mp	Mion-Rock outcrop complex	40,887	1.7
MR	Mion-Litle association, strongly sloping	78,696	3.3
MS	Moreno-Cypher association, hilly	4,854	0.2
MT	Morval-Moreno association, sloping	21,511	0.9
Mu	Mughouse-Swastika complex	17,515	0.7
OG	Oro Grande-Meloche association, steep	17,844	0.7
OT	Oro Grande-Tafoya association	15,979	0.7
PE	Penrose loam, 0 to 9 percent slopes	15,339	0.6
PL	Plack fine sandy loam, 0 to 9 percent slopes	746	([1])
PV	Ponil-Vamer association, hilly	43,836	1.8
Ra	Raton-Barela complex	45,883	1.9
RD	Raton-Dalcan association, rolling	17,437	0.7
RE	Raton-Wellsville association, steep	1,318	0.1
RG	Ring-Brycan association, moderately sloping	6,789	0.3
RV	Riverwash	3,119	0.1
Rz	Riverwash-Manzano complex	13,639	0.6
SaC	Saladon mucky silty clay, 0 to 5 percent slopes	3,668	0.1
SeB	Seelez sandy loam, dark, 0 to 3 percent slopes	1,234	0.1
SfC	Seelez fine sandy loam, 0 to 5 percent slopes	2,434	0.1
SnA	Seelez fine sandy loam, dark, 0 to 1 percent slopes	399	([1])
SoA	Swastika silt loam, 0 to 1 percent slopes	16,938	0.7
SpD	Swastika silt loam, 3 to 7 percent slopes	8,419	0.3
SsB	Swastika silty clay loam, 1 to 3 percent slopes	23,497	1.0
St	Swastika silty clay loam, saline	7,811	0.3
SW	Swastika association, gently sloping	83,901	3.5
SX	Swastika-La Brier association, saline	12,335	0.5
TED	Texline fine sandy loam, 0 to 7 percent slopes	4,315	0.2
TH	Thunderbird-Torreon association, undulating	9,351	0.4
TNE	Tinaja gravelly sandy clay loam, 3 to 25 percent slopes	7,643	0.3
TO	Torreon-Deacon association sloping	10,007	0.4
Tr	Travessilla-Rock outcrop complex	3,071	0.1
TS	Travessilla-Bernal-Rock outcrop association	21,190	0.9

TABLE 1.—*Acreage and proportionate extent of the soils*—Continued

Map symbol	Soil name	Acres	Percent	Map symbol	Soil name	Acres	Percent
TX	Tricon-Plack association, gently sloping	3,809	0.2	WEG	Wellsville cobbly loam, 10 to 50 percent slopes	4,385	0.2
US	Ustochrepts-Rock outcrop complex	18,357	0.8		Intermittent lakes	3,437	0.1
Ve	Vermejo silty clay loam	28,926	1.2		Lakes	5,027	0.2
Vm	Vermejo silty clay loam, saline	24,201	1.0				
Vs2	Vermejo and Swastika soils, eroded	8,961	0.4		Total	2,409,600	100.0

[1] Less than 0.1 percent.

representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Cypher gravelly loam has a profile similar to the one described as representative of the series, but it is lighter in color and has more gravel. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This unit is used for recreation, wildlife habitat, woodland, and watershed. Capability subclass VIIe dryland. Abreu soil in woodland suitability group 6f1, Cypher soil in 6d2.

Angostura Series

The Angostura series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and residuum derived from sandstone and acid igneous rock. Slopes range from 20 to 60 percent. Elevation is 9,000 to 12,000 feet. The vegetation is Engelmann spruce, subalpine fir, and quaking aspen and an understory of pine dropseed, tall oatgrass, and mountain muhly. Precipitation is 27 to 30 inches, the mean annual soil temperature is 34° to 40° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is light brownish gray stony loam about 7 inches thick. It is covered with about 2 inches of decomposing forest litter. The subsoil extends to a depth of 60 inches. It is light yellowish brown stony sandy clay loam. The soil is medium acid throughout.

The soil is moderately permeable. Available water capacity is 4 to 7 inches. Effective rooting depth is more than 60 inches.

Angostura soils are used for woodland, wildlife habitat, recreation, and watershed.

Representative profile of Angostura stony loam in an area of Angostura association, steep, about 3 miles west of Black Lake, New Mexico, or 9,200 feet north and 9,450 feet west of the southeast corner sec. 23, T. 24 N., R. 15 E.

O1&O2—2 inches to 0; decayed and decaying forest litter.

A2—0 to 7 inches; light brownish gray (10YR 6/2) stony loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure parting to weak fine granular; soft dry, friable moist; many fine medium and coarse roots; common very fine tubular pores; 25 percent rock fragments; medium acid; clear smooth boundary.

B&A—7 to 22 inches; 70 percent B2t material which is light yellowish brown (10YR 6/4) stony sandy clay loam; brown (7.5YR 4/4) moist; slightly hard dry, friable moist, plastic wet; few thin clay films on sand grains and as bridges; 30 percent A2 material, which is light brownish gray (10YR 6/2) stony loam, brown (10YR 4/3) moist; soft dry, friable moist; the mass has weak coarse subangular blocky structure parting to weak fine granular; many fine medium and coarse roots; common very fine tubular pores; 25 percent rock fragments; medium acid; gradual smooth boundary.

B2t—22 to 43 inches; light yellowish brown (10YR 6/4) stony sandy clay loam, brown (7.5YR 4/4) moist; moderate fine prismatic structure; slightly hard dry, friable moist, plastic wet; common fine medium and coarse common roots, common very fine tubular pores; few thin clay films; 40 percent rock fragments; medium acid; gradual wavy boundary.

B3t—43 to 60 inches; light yellowish brown (10YR 6/4) stony sandy clay loam, brown (7.5YR 4/4) moist; massive; slightly hard dry, friable moist, slightly plastic wet; few roots; common very fine tubular pores; few thin clay films; 60 percent rock fragments; medium acid.

Rock fragments are angular sandstone and intrusive and range in size from gravel to stones. The A2 horizon is sandy loam, fine sandy loam, very fine sandy loam, or loam that is 15 to 35 percent rock fragments. It has hue of 10YR or 7.5YR, dry value of 6 or 7, and chroma of 2 through 4 dry and moist. In the B&A horizon, the B2t material has the same ranges as the B2t horizon and the A2 material has the same ranges as the A2 horizon. The B2t horizon is sandy clay loam that is 35 to 65 percent rock fragments. It has hue of 7.5YR or 10YR and dry value of 5 or 6.

AG—Angostura association, steep. This mapping unit occupies mountainsides at elevations of 9,000 to 12,000 feet. It is about 60 percent an Angostura stony fine

sandy loam and about 25 percent an Angostura stony loam. Slopes are 20 to 60 percent. Both soils occur throughout the association.

About 15 percent of this mapping unit is included areas of Rubble land, Etoe and Etown soils, and Cumulic Haplaquolls. Rock outcrop occurs throughout the association. Rubble land is below Rock outcrop. The Etoe and Etown soils are on the lower slopes. The Cumulic Haplaquolls are in small, wet valleys.

Angostura stony fine sandy loam has a profile similar to the one described as representative of the series, but it has a stony fine sandy loam surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Angostura stony loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This unit is used for woodland, wildlife habitat, recreation, and watershed. Angostura soils in capability subclass VIIs dryland; woodland suitability group 3f1 for aspen, 7f1 for other species.

AN—Angostura-Tolby association, steep. This mapping unit occupies mountainsides at elevations of 9,000 to 12,400 feet. It is about 50 percent an Angostura stony sandy loam that has slopes of 25 to 45 percent and about 35 percent a Tolby stony loam that has slopes of 25 to 60 percent. The Tolby soil, which is the more sloping, is generally at the higher elevations.

About 15 percent of this mapping unit is included areas of Bundo and Cypher soils, Rock outcrop, and small areas where the annual soil temperature is less than 32° F. Bundo soils are on the less sloping mountainsides. Cypher soils are on ridge crests. Rock outcrop occurs throughout the association. The colder soils are at the higher elevations.

Angostura stony sandy loam has a profile similar to the one described as representative of the series, but it has a stony sandy loam surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Tolby stony loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This unit is used for woodland, wildlife habitat, recreation, and watershed. Capability subclass VIIs dryland. Angostura soil in woodland suitability groups 7f1 and 3f1, Tolby soil in 7s1.

Apache Series

The Apache series consists of very shallow to shallow, well drained soils on mesas and basalt flows. These soils formed in residuum derived from basalt. Slopes are 1 to 9 percent. Elevation is 6,000 to 7,500 feet. The vegetation is blue grama, sideoats grama, fringed sagewort, and broom snakeweed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown cobbly loam about 4 inches thick. The subsoil is dark grayish brown gravelly clay loam about 5 inches thick. The substratum is a mixture of white, soft to hard lime masses and very pale brown cobbly clay loam about 8 inches thick. The depth to basalt is 17 inches. Soil reaction is moderately alkaline throughout the profile.

The soil is moderately permeable. Available water capacity is 1 to 2 inches. Effective rooting depth is 6 to 20 inches.

Apache soils are used for range, wildlife habitat, watershed, and recreation.

Representative profile of Apache cobbly loam in an area of Apache-Ayon complex, 1 to 9 percent slopes, 2,200 feet south and 2,080 feet east of the northwest corner sec. 13, T. 26 N., R. 25 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft dry, friable moist, slightly plastic wet; many fine and very fine roots; many fine interstitial pores; 30 percent rock fragments; strongly calcareous; moderately alkaline; clear wavy boundary.

B2—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and plastic wet; common fine and very fine roots; common fine tubular pores; 10 percent rock fragments; strongly calcareous; moderately alkaline; clear wavy boundary.

Cca—9 to 17 inches; mixture of white (10YR 8/2) and grayish brown (10YR 5/2) cobbly clay loam, very pale brown (10YR 7/3) and very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard dry, friable moist, slightly plastic wet; common fine and very fine roots; many fine interstitial pores; 25 percent rock fragments; strongly calcareous; soft to hard carbonate coatings; moderately alkaline; abrupt wavy boundary.

R—17 inches; basalt with carbonate coatings at upper surface and in cracks.

Rock fragments are basalt and range in size from pebbles to stone. They make up 10 to 35 percent of the profile. Of the total rock fragments, about 30 percent is gravel, 45 percent is cobbles, and 25 percent is stone. The A horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 to 3. It is silt loam or loam and is modified mostly by rock fragments. The B horizon has value of 4 or 5 dry and chroma of 2 or 3. It is clay loam, loam, or silty clay loam, and is modified mostly by rock fragments. The depth to basalt ranges from 6 to 20 inches.

ApD—Apache-Ayon complex, 1 to 9 percent slopes. This mapping unit is on basalt uplands at elevations of 6,000 to 7,500 feet. It is about 45 percent an Apache cobbly loam that has slopes of 1 to 9 percent and about 40 percent an Ayon cobbly silty loam that has slopes of 2 to 5 percent. The Apache soil is on the lower, more smoothly sloping parts of fans.

About 15 percent of this mapping unit is included areas of Rock outcrop and Capulin, Thunderbird, and

Torreon soils. Rock outcrop occurs throughout the mapping unit. Thunderbird soils are near Rock outcrop. Capulin and Torreon soils are in the smoother areas.

Apache cobbly loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Ayon cobbly silt loam has the profile described as representative for the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This unit is used for range, wildlife habitat, watershed, and recreation. Capability subclass VIIs dryland; Malpais range site.

Aridic Argiustolls

The Aridic Argiustolls make up a group of closely related soils on upland vertical basalt escarpments and basalt-capped mesas. These soils formed in a variety of materials weathered from sandstone, shale, basalt, and limestone. Slopes are 20 to 55 percent. Elevation is 6,000 to 8,200 feet. The vegetation is blue grama, western wheatgrass, Arizona fescue, little bluestem, Gambel oak, mountainmahogany, scattered pinyon pine, scattered one-seed juniper, and scattered ponderosa pine. Precipitation is 14 to 19 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 120 to 160 days.

Typically, these soils have a dark colored variably textured surface layer over a finer textured subsoil that has a distinct accumulation of clay. The surface layer is dark grayish brown and brown clay loam and silty clay loam about 6 inches thick. The subsoil is brown clay about 20 inches thick. The substratum is grayish brown and brown clay and silty clay. Soil reaction is mildly alkaline to moderately alkaline.

Aridic Argiustolls are used for range, wildlife habitat, recreation, and watershed.

The depth to bedrock varies. It ranges from 10 to more than 60 inches but can vary within short distances. Rock fragments also vary widely throughout the profile and range in size from gravel to boulders and in volume from 0 to 50 percent. The surface layer is loam or silty clay loam. The subsoil is clay loam or clay. The substratum is loam or clay. In places visible gypsum crystals occur in the lower part of the C horizon.

Some of these soils have a mean annual soil temperature of 42° to 47° F.

ARF—Aridic Argiustolls-Rock outcrop association, steep. This mapping unit is on the sides of basalt-capped mesas at elevations of 6,000 to 8,200 feet. It is about 80 percent Aridic Argiustolls that have slopes of 20 to 40 percent and about 15 percent Rock outcrop and Rubble land that have slopes of 20 to 70 percent. Aridic Argiustolls are on all positions in the mapping unit. Rock outcrop is on the nearly vertical basalt escarpments, ridges, and the exposed sandstone, limestone, and shale benches throughout the mapping unit. Rubble land is on fans at the base of the basalt escarpments.

About 5 percent of this mapping unit is included areas of Burnac, Deacon, Fuera, Mion, and Raton soils. Burnac, Fuera, and Raton soils are near the higher end of the elevation range, and Deacon and Mion soils near the lower end.

Aridic Argiustolls have the profile described as representative of the group. Runoff is medium to rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Rock outcrop is basalt, sandstone, limestone, and shale. Runoff is very rapid.

This mapping unit is used for wildlife habitat, range, recreation, and watershed. Aridic Argiustolls in capability subclass VIIe dryland, Breaks range site; Rock outcrop in capability subclass VIIIs.

ARG—Aridic Argiustolls-Rock outcrop complex, very steep. This mapping unit is on side slopes of basalt-capped mesas at elevations of 6,000 to 7,500 feet. It is about 65 percent an Aridic Argiustolls that have slopes of 40 to 55 percent and 20 percent Rock outcrop that has slopes of 30 to 75 percent. Aridic Argiustolls are on all parts of the unit. Rock outcrop is near vertical escarpments at high elevations. Sandstone and shale ridges and benches occur throughout the mapping unit.

About 15 percent of this mapping unit is included areas of Apache, Ayon, Colmor, Capulin, Litle, and Mion soils. Apache, Ayon, and Mion soils occur on all parts of the unit. Colmor, Capulin, and Litle soils are on the smoother parts at the lower elevations.

Aridic Argiustolls have a profile similar to the one described as representative of the group, but it is stony and bouldery. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Rock outcrop is basalt, sandstone, and shale. Runoff is very rapid.

This mapping unit is used for wildlife habitat, range, recreation, and watershed. Capability subclass VIIs dryland. Aridic Argiustolls in Breaks range site.

Ayon Series

The Ayon series consists of deep, well drained soils on basalt-capped mesas and basalt flows. These soils formed in colluvium and alluvium derived mostly from basalt and some mixed eolian material. Slopes are 1 to 9 percent. Elevation is 6,000 to 7,500 feet. The vegetation is blue grama, sideoats grama, and little bluestem. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is from 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown stony silt loam about 6 inches thick. The subsoil is dark grayish brown stony loam about 11 inches thick. The substratum is white, strongly calcareous stony sandy clay loam and stony loam. Soil reaction is mildly alkaline in the surface layer and moderately alkaline in the subsoil and substratum.

The soil is moderately permeable. Available water capacity is 2 to 3 inches. Effective rooting depth is 60 inches or more.

Ayon soils are used for range, wildlife habitat, and watershed. The Ayon soils in Colfax County are mapped only with Apache, Capulin, and Deacon soils.

Representative profile of Ayon stony silt loam in an area of Apache-Ayon complex, 1 to 9 percent slopes, 1,100 feet east and 740 feet south of the northwest corner of sec. 13, T. 26 N., R. 25 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) stony silt loam, very dark brown (10YR 2/2) moist; moderate coarse gran-

ular structure; slightly hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; common fine interstitial pores; 30 percent rounded basalt stones, cobbles, and gravel; moderately calcareous; mildly alkaline; clear smooth boundary.

B2—6 to 17 inches; dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; common fine tubular pores; 45 percent rounded basalt stones, cobbles, and gravel; moderately calcareous; moderately alkaline; clear smooth boundary.

C1ca—17 to 31 inches; white (10YR 8/1) stony clay loam, light gray (10YR 7/2) moist; massive; hard dry, firm moist, nonsticky and plastic wet; few fine and very fine roots; 65 percent rounded basalt stones, cobbles, and gravel; strongly calcareous rock fragments have lime coatings; some discontinuous lime layers; indurated caliche; moderately alkaline; clear wavy boundary.

C2ca—31 to 60 inches; white (10YR 8/1) stony loam, light gray (10YR 7/2) moist; massive; slightly hard dry, friable moist, slightly sticky and plastic wet; very few roots; 65 percent rounded basalt stones, cobbles, and gravel; strongly calcareous rock fragments have lime coatings and there are discontinuous, strongly lime cemented layers; moderately alkaline.

Rock fragments are rounded basalt and range in size from pebbles to stones. The A1 horizon has value of 4 or 5 dry and 2 or 3 moist. It is silt loam that is 30 to 50 percent rock fragments. The B2 horizon has value of 3 through 5 dry and chroma of 2 or 3 dry and moist. It is loam, clay loam, or silty clay loam that is 40 to 80 percent rock fragments. The Cca horizon has value of 6 through 8 dry and 5 through 7 moist and chroma of 1 through 3 dry and moist. It is sandy clay loam, loam, or clay loam that is 45 to 80 percent rock fragments.

Bandera Series

The Bandera series consists of deep, somewhat excessively drained soils on and adjacent to volcanic cinder cones and on uplands and fans. These soils formed in eolian and cindery material of volcanic origin. Slopes are 25 to 50 percent. Elevation is 7,000 to 9,000 feet. The vegetation is blue grama, side-oats grama, little bluestem, Arizona fescue, scattered pinyon pine, and one-seed juniper. Precipitation is 15 to 20 inches, the mean annual soil temperature is 41° to 45° F, and the frost-free season is from 100 to 120 days.

In a representative profile, the surface layer is a dark grayish brown gravelly loam about 3 inches thick. The next layer is grayish brown gravelly loam about 5 inches thick. The substratum is grayish brown gravelly loam and very dark gray cinders with segregated lime. Soil reaction is mildly alkaline in the surface layer and grades to moderately alkaline in the underlying material.

The soil is moderately permeable. Available water capacity is 3 to 6 inches. Effective rooting depth is 60 inches or more.

Bandera soils are used for range, wildlife habitat, recreation, sources of cinders for construction materials, and watershed.

Representative profile of Bandera gravelly loam in an area of Bandera association 350 feet east of the northwest corner of sec. 12, T. 28 N., R. 27 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable moist; many fine and very fine roots; many very fine interstitial pores; 30 percent gravel-size cinders; mildly alkaline; clear wavy boundary.

AC—3 to 8 inches; grayish brown (10YR 5/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; loose dry, very friable moist, slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; 35 percent gravel-size cinders; mildly alkaline; clear wavy boundary.

C1—8 to 19 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft dry, very friable moist; many fine and very fine roots; many very fine interstitial pores; 35 percent gravel-size cinders; slightly calcareous with few lime threads and masses on cinders; moderately alkaline; gradual wavy boundary.

C2—19 to 28 inches; very dark gray (N 3/0) cinders, black (N 2/0) moist; single grained; loose dry and moist; few fine roots; many interstitial pores; slightly calcareous with common segregated lime threads and masses of lime on cinders; moderately alkaline; gradual wavy boundary.

C3—28 to 60 inches; very dark gray (N 3/0) cinders, black (N 2/0) moist; single grained; loose dry and moist; many interstitial pores; slightly calcareous; many segregated masses of lime on cinders.

Rock fragments are cinder pebbles and range from 25 to 35 percent of the A and AC horizons. The A horizon has value of 4 or 5 dry and 2 or 3 moist. It is gravelly loam or gravelly silt loam. The AC horizon has a value of 4 or 5 dry and 2 or 3 moist. It is gravelly loam or gravelly silt loam. Some of the C horizons have weak lime cemented lenses and pockets. The depth to cinders is 12 to 36 inches.

BA—Bandera association. This mapping unit is on volcanic cones and adjacent fans at elevations of 7,000 to 9,000 feet. Slopes are 25 to 50 percent. This unit is about 70 percent a Bandera gravelly loam that has slopes of 25 to 50 percent and about 15 percent a Cinder land that has slopes of 25 to 50 percent. Bandera

gravelly loam is on the lower and middle parts of cones and on fans. Cinder land is on the upper parts of cones and in craters.

About 15 percent of this mapping unit is included areas of Apache, Ayon, and Capulin soils and Rock outcrop. Apache, Ayon, and Capulin soils are on steep fans at the bases of cones. Rock outcrop is along the lower slopes of cones and on fans at the bases of cones.

Bandera gravelly loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Cinder land is not soil and has no representative profile.

This mapping unit is used for wildlife habitat, range, construction materials, landscaping, recreation, and watershed. Bandera soil in capability subclass VIIe dryland, Cinder range site; Cinder land in capability subclass VIIIs dryland.

Barela Series

The Barela series consists of deep well drained soils on basalt-capped mesas and basalt flows. These soils formed in alluvium and residuum derived from basalt and other volcanic debris that were modified by mixed eolian material. Slopes are 1 to 9 percent. Elevation is 7,500 to 8,700 feet. The vegetation is blue grama, Arizona fescue, and western wheatgrass. Precipitation is 15 to 20 inches, the mean annual soil temperature is about 42° to 47° F, and the frost-free season is less than 90 days.

In a representative profile the surface layer is dark grayish silt loam about 4 inches thick. The subsoil is dark grayish brown silty clay loam, brown silty clay, brown stony clay, and grayish brown stony clay about 37 inches thick. The depth to basalt is 41 inches. Soil reaction is neutral in the surface layer and upper part of the subsoil and mildly alkaline in the lower part of the subsoil.

The soil is slowly permeable. Available water capacity is 5 to 6 inches. Effective rooting depth is 40 to 60 inches.

Barela soils are used for range, recreation, dryland crops, wildlife habitat, and watershed.

Representative profile of Barela silt loam in an area of Barela-Yankee association 2,900 feet north and 40 feet west of the southeast corner sec. 6, T. 31 N., R. 24 E.

A1—0 to 4 inches; dark gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft dry, very friable moist; many fine and very fine roots; few very fine interstitial and few very fine tubular pores; neutral; clear smooth boundary.

B1—4 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure parting to strong very fine granular; hard dry, friable moist, sticky and plastic wet; neutral; clear smooth boundary.

B21t—8 to 12 inches; brown (10YR 4/3) silty clay, very dark grayish brown (10YR 3/2) moist; strong fine and very fine angular blocky structure; very hard dry, firm moist, sticky and very plastic wet; common fine and very fine roots; few fine tubular pores; continuous thin clay films on peds; few basalt stones and cobbles; neutral; clear smooth boundary.

B22t—12 to 31 inches; brown (7.5YR 5/4) stony clay, brown (7.5Y 4/2) moist; moderate medium prismatic structure parting to strong angular blocky; very hard dry, very firm moist, sticky and very plastic wet; few fine and very fine roots; few fine tubular pores; continuous thin clay films on peds; 20 percent basalt stones, cobbles, and gravel; neutral; clear smooth boundary.

B23t—31 to 41 inches; grayish brown (10YR 5/2) stony clay, brown (10YR 4/3) moist; weak and moderate medium angular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; very few very fine roots; very few very fine tubular pores; 50 percent basalt stones, cobbles, and gravel; mildly alkaline; abrupt wavy boundary.

R—41 inches; hard basalt bedrock several feet thick.

Rock fragments are rounded basalt stone, cobbles, and pebbles. The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 dry and 2 or 3 moist, and chroma of 1 through 3 dry or moist. It is silt loam or loam that is a trace to 10 percent rock fragments. The B2t horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry or moist. It is clay, silty clay, silty clay loam, or clay loam that is 5 to 20 percent rock fragments in the upper part and 15 to 50 percent in the lower part, with an average of 20 to 35 percent.

BE—Barela-Yankee association. This mapping unit is on basalt-capped mesas at elevations of 7,500 to 8,700 feet. Slopes are 0 to 9 percent. This unit is about 25 percent a Barela silt loam that has slopes of 1 to 5 percent, 20 percent a Barela stony silt loam that has slopes of 3 to 9 percent, and about 40 percent a Yankee silt loam that has slopes of 0 to 9 percent. Barela silt loam is on smooth upland areas. Barela stony silt loam is on slightly higher areas. Yankee silt loam is on valley fills and fans, which are generally the lowest positions in the mapping unit.

About 15 percent of this mapping unit is included areas of Raton, Brycan, and Hillery soils. Raton soils are on short, stronger slopes. The Brycan soils are in drainageways and on the lower ends of fans. The Hillery soils are associated with Barela stony silt loam.

Barela silt loam has the profile described as representative of the series. Runoff is medium. The hazards of erosion and soil blowing are moderate.

Barela stony silt loam has a profile similar to the one described as representative of the series, but it has a stony surface layer. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Yankee silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, dryland crops, wildlife habitat, watershed, and recreation. Barela silt loam and Yankee soil in capability unit IVe–1 (RM) dryland; Mountain Grassland range site. Barela stony silt loam in capability subclass VIs; Mountain Grassland range site.

Bernal Series

The Bernal series consists of very shallow to shallow, well drained soils on breaks, ridges, and mesas. These soils formed in residuum derived from sandstone. Slopes are 1 to 9 percent. Elevation is 5,600 to 6,500 feet. The vegetation is blue grama, sand dropseed, sideoats grama, and three-awn. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 55° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown loam about 3 inches thick. The subsoil is brown sandy clay loam about 15 inches thick. The depth to sandstone bedrock is 18 inches. Soil reaction is neutral and mildly alkaline.

The soil is moderately permeable. Available water capacity is 2 to 3 inches. Effective rooting depth is 8 to 20 inches.

Bernal soils are used for range, wildlife habitat, recreation, and watershed.

These soils are mapped only with Travessilla soils and Rock outcrop.

Representative profile of Bernal loam in an area of Travessilla-Bernal-Rock outcrop association 950 feet north and 615 feet east of the southwest corner sec. 15, T. 26 N., R. 27 E.

A1—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak very fine granular and weak fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many interstitial pores; mildly alkaline; clear smooth boundary.

B1—3 to 7 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; common fine and very fine roots; common very fine tubular pores; mildly alkaline; clear smooth boundary.

B21t—7 to 13 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard dry, firm moist, slightly sticky and plastic wet; few fine and very fine roots; common very fine tubular pores; common thin clay films on peds; neutral; clear smooth boundary.

B22t—13 to 18 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard dry, very firm moist, slightly sticky and plastic wet; few fine and very fine roots; common very fine tubular pores; common thin clay films on faces of peds; mildly alkaline; abrupt smooth boundary.

R—18 inches; hard sandstone bedrock with few fractures.

Rock fragments are sandstone and make up a trace to 15 percent of the A horizon. They range from pebbles to stones in size. The A horizon has hue of 10YR to 7.5YR, value of 4 to 5 dry, and chroma of 2 to 3. It is loam, sandy clay loam, or fine sandy loam. The B2t horizon has value of 4 or 5 dry and 3 or 4 moist and chroma of 2 through 4. The depth to sandstone bedrock is 8 to 20 inches.

Berthoud Series

The Berthoud series consists of deep, well drained soils on uplands and fans. These soils formed in alluvium derived mostly from sandstone and shale. Slopes are 3 to 9 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, galleta, and yucca. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown loam about 4 inches thick. The subsoil is light brownish gray loam about 26 inches thick. The substratum is light brownish gray clay loam and sandy clay loam. Soil reaction is mildly alkaline in the surface layer and moderately alkaline in the subsoil and substratum.

The soil is moderately permeable. Available water capacity is 8 to 12 inches. Effective rooting depth is more than 60 inches.

Berthoud soils are used for range, irrigated crops, wildlife habitat, homesites, recreation, and watershed.

Representative profile of Berthoud loam, 3 to 9 percent slopes, 365 feet south and 2,145 feet east of the northwest corner sec. 20, T. 31 N., R. 24 E.

A1—0 to 4 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak thick platy structure parting to weak very fine granular; slightly hard dry, friable moist, sticky and plastic wet; many fine and very fine roots; many very fine interstitial pores and few very fine tubular pores; mildly alkaline; abrupt smooth boundary.

B2—4 to 11 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure parting to moderate fine and medium subangular blocky; slightly hard dry, friable moist, sticky and plastic wet; many fine and very fine roots; common very fine tubular pores; few fine gravel; strongly calcareous; moderately alkaline; clear wavy boundary.

B3ca—11 to 30 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard dry, friable moist, slightly

sticky and slightly plastic wet; few fine and very fine roots; many very fine tubular pores; few fine gravel; strongly calcareous; few fine lime mycelia; moderately alkaline; clear wavy boundary.

C1ca—30 to 51 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard dry, friable moist, slightly sticky and plastic wet; few fine roots; many very fine tubular pores; strongly calcareous; few fine lime mycelia; moderately alkaline; clear wavy boundary.

C2—51 to 64 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard dry, very friable moist, slightly sticky and plastic wet; few fine tubular pores; strongly calcareous; moderately alkaline.

Rock fragments are sandstone and shale of gravel size and make up 0 to 15 percent of the profile. The A horizon has value of 5 or 6 dry and 3 through 5 moist and chroma of 2 to 3. It is loam, silt loam, or very fine sandy loam. The B2 horizon has value of 5 or 6 dry and 3 through 5 moist and chroma of 2 of 3. It is loam or clay loam. The B3ca and Cca horizons have value of 5 or 6 dry and 4 or 5 moist and chroma of 2 through 4. They are clay loam or loam. The C2 horizon has value of 5 or 6 dry and 4 or 5 moist and chroma of 2 through 4.

BhD—Berthoud loam, 3 to 9 percent slopes. This moderately sloping soil is on fans at elevations of 6,000 to 7,000 feet.

About 10 percent of this mapping unit is included areas of La Brier, Swastika, and Vermejo soils and Rock outcrop. The La Brier soil is in small drainageways. The Swastika soil is in small smooth areas. The Vermejo soil is at the lower end of fans. Rock outcrop is on small dikes and ridges.

Berthoud loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high because the soil receives runoff from higher lying soils. The hazard of soil blowing is moderate.

This soil is used for range, irrigated crops, wildlife habitat, homesites, recreation, and watershed. Capability unit IIIe–1 irrigated, subclass VIe dryland; Loamy range site.

Brycan Series

The Brycan series consists of deep, well drained soils on alluvial fans and in valleys. These soils formed in alluvium derived from intrusive rocks, sandstone, and shale. Slopes are 0 to 7 percent. Elevation is 8,200 to 8,500 feet. The vegetation is blue grama, wolftail, prairie junegrass, bottlebrush squirreltail, western wheatgrass, and Kentucky bluegrass. Precipitation is 16 to 18 inches, the mean annual soil temperature is from 44° to 47° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown loam about 4 inches thick. The subsoil is brown loam and sandy clay loam about 27 inches thick. The substratum is brown and yellowish brown sandy clay loam and clay loam. Soil reaction is medium acid in the surface layer, slightly acid and neutral in the subsoil, and mildly alkaline and moderately alkaline in the substratum.

The soil is moderately or moderately slowly permeable. Available water capacity is 8 to 11 inches. Effective rooting depth is 60 inches or more.

Brycan soils are used for irrigated and dryland crops, range, wildlife habitat, recreation, and watershed.

Representative profile of Brycan loam in an area of Brycan association, moderately sloping, about 7 miles southwest of Vermejo Park Headquarters or 2,400 feet south and 600 feet west of the dirt road junction at Brimmer Lakes. Unsectionized area:

A1—0 to 4 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft dry, friable moist, slightly sticky and slightly plastic wet; many very fine and fine roots; many very fine interstitial pores; medium acid; clear smooth boundary.

B1—4 to 14 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common very fine and fine roots; common very fine tubular pores; slightly acid; clear smooth boundary.

B2—14 to 31 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak medium and coarse prismatic structure parting to weak coarse subangular blocky; slightly hard dry, firm moist, slightly sticky and plastic wet; few very fine and fine roots; common very fine tubular pores; neutral; clear smooth boundary.

C—31 to 54 inches; yellowish brown (10YR 5/4) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; soft dry, friable moist, slightly sticky and plastic wet; very few very fine and fine roots; very few very fine tubular pores; mildly alkaline; clear smooth boundary.

IIB2—54 to 60 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; massive; slightly hard dry, firm moist, sticky and plastic wet; very few very fine and fine roots; very few very fine tubular pores; slightly calcareous; few fine threads of lime; moderately alkaline.

The thickness of the solum ranges from 22 to 40 inches. Rock fragments are of mixed origin and range in size from pebbles to stones. They are 0 to 5 percent in the A1 and B2 horizons and 0 to 25 percent in the C horizon. The A horizon has value of 3 or 4 dry and 2 or 3 moist and chroma of 2 or 3. It is loam, sandy loam, or sandy clay loam. The B2 horizon has value of 4 or 5 dry and 3 or 4 moist and chroma of 2 through 4. The

C horizon has value of 5 or 6 dry and 3 through 5 moist and chroma of 3 or 4. Some profiles have discontinuous lenses and pockets of silt, silt loam, or sandy loam in the lower part of the C horizon. The C horizon is clay loam or sandy clay loam.

BR—Brycan association, moderately sloping. This mapping unit is on alluvial fans, in wide swales, and on flats at elevations of 8,200 to 8,500 feet. It is about 45 percent a Brycan loam with slopes of 0 to 3 percent on lower and smoother uplands and flats and 35 percent a Brycan loam with slopes of 3 to 7 percent on valley sides.

About 20 percent of this mapping unit is included areas of Ring, Vamer, Dargol, La Brier, Deacon, and Manzano soils and Rock outcrop. The Ring, Vamer, and Dargol soils are on the higher positions. The La Brier, Deacon, and Manzano soils are in the lower areas around drainageways. Rock outcrop occurs throughout this unit.

The Brycan loam that has slopes of 3 to 7 percent has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. The Brycan loam that has 0 to 3 percent slopes has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is medium. The hazards of water erosion and soil blowing are slight.

This mapping unit is used for irrigated and dryland crops, range, recreation, wildlife habitat, and watershed. Capability unit IVe–2 irrigated, IVe–1 (RM) dryland. Brycan soil, 0 to 3 percent slopes, in Mountain Valley range site. Brycan soil, 3 to 7 percent slopes, in Mountain Grassland range site.

Bundo Series

The Bundo series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from acid igneous intrusive rock. Slopes are 25 to 60 percent. Elevation is 8,000 to 10,500 feet. The vegetation is Douglas-fir, white fir, and limber pine and an understory of kinnikinnick, oregongrape, mockorange, and mountain grasses. Precipitation is 22 to 27 inches, the mean annual soil temperature is 39° to 42° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is light gray gravelly sandy loam about 24 inches thick. It is covered with about 3 inches of decomposing forest litter. The subsurface layer is light gray gravelly sandy loam about 6 inches thick. The subsoil is light yellowish brown gravelly loam and very gravelly sandy clay loam. The soil is medium acid to strongly acid in the surface and subsurface layers and medium acid in the subsoil.

The soil is moderately rapidly permeable. Available water capacity is 5 to 7 inches. Effective rooting depth is 60 inches or more.

Bundo soils are used for woodland, wildlife habitat, recreation, and watershed.

Representative profile of Bundo gravelly sandy loam is an area of Bundo association, steep, about 2.5 miles northeast of Eagle Nest, or 1 mile northeast of the northeast end of the Eagle Nest airstrip in line with the airstrip:

O1—3 inches to 0; decomposed and decomposing forest litter.

A21—0 to 11 inches; light gray (10YR 7/2) gravelly sandy loam, brown (10YR 5/3) moist; moderate very fine granular structure; soft dry, very friable moist; many fine and coarse roots; common fine pores; 15 percent gravel; medium acid; gradual smooth boundary.

A22—11 to 24 inches; light gray (10YR 7/2) gravelly sandy loam, pale brown (10YR 6/3) moist; strong very fine granular structure; slightly hard dry, friable moist; few medium and coarse roots; common fine pores; 35 percent gravel; strongly acid; gradual smooth boundary.

A&B—24 to 30 inches; light gray (10YR 7/2) gravelly sandy loam, pale brown (10YR 6/3) moist; moderate fine granular structure; slightly hard dry, friable moist; B2t lamellae 1/4 to 1 inch thick of light yellowish brown (10YR 5/4) moist; moderate fine subangular blocky structure; hard dry, firm moist, slightly sticky and slightly plastic wet; few medium and coarse roots; 45 percent gravel; strongly acid; gradual wavy boundary.

B&A—30 to 56 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; strong fine subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; A2 material very pale brown (10YR 7/3) gravelly sandy loam, yellowish brown (10YR 4/4) moist; weak fine granular structure; slightly hard dry, friable moist; A2 material in pockets and coatings on peds and coarse fragments; 45 percent gravel; medium acid; gradual smooth boundary.

B21t—56 to 70 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; common fine distinct mottles of brown (7.5YR 4/2), dark brown (7.5YR 3/2) moist; moderate and strong fine subangular blocky structure; hard dry, firm moist, sticky and plastic wet; common moderately thick clay films on peds and bridging between some coarse particles; 5 percent by volume of A2 material on top of coarse fragments; 50 percent gravel; medium acid; gradual smooth boundary.

B22t—70 to 94 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; common fine distinct mottles of brown (7.5YR 4/2), dark brown (7.5YR 3/2) moist; massive; hard dry, firm moist, sticky and plastic wet; common moderately thick clay films on and bridging coarse fragments; bleached A2 material on some coarse fragments; 80 percent gravel; medium acid.

Rock fragments are intrusive rocks and range in size from pebbles to stones. The reaction is strongly acid to medium acid in the A horizon and medium acid to slightly acid in the B horizon. The A2 horizon has hue of 10YR or 7.5YR, value of 6 through 8 dry and 5 or 6 moist, and chroma of 2 through 4 dry and moist. It is sandy loam or loam that is 15 to 50 percent rock fragments. In the A&B and B&A horizons, the A2 material has hue of 10YR or 7.5YR, value of 6 or 7 dry and 4 through 6 moist, and chroma of 2 through 4 dry and moist. The B2t material has hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 4 through 6 dry and moist. It is loam or sandy loam that is 35 to 50 percent rock fragments. The B21t and B22t horizons have hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 2 through 4 dry and 4 through 6 moist. They are loam or sandy clay loam that is 40 to 85 percent rock fragments.

BU—Bundo association, steep. This mapping unit is on mountainsides at elevations of 8,000 to 10,500 feet. It is about 75 percent a Bundo gravelly sandy loam that has slopes of 25 to 60 percent.

About 25 percent of this mapping unit is included areas of Angostura, Cypher, and Tolby soils and a fine textured soil that is shallow over bedrock. The Angostura and Tolby soils are at the higher part of the elevation range. They occur as small areas on north-facing slopes. Cypher soils are on ridges and shelves throughout the mapping unit. The shallow, fine textured soil is near Cypher soils.

Bundo gravelly sandy loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for woodland, wildlife habitat, recreation, and watershed. Capability subclass VIIe dryland; woodland suitability group 6f1.

Burnac Series

The Burnac series consists of deep, well drained soils. These soils formed in stony, fine textured residuum derived from basalt flows. Slopes are 1 to 25 percent. Elevation is 7,500 to 11,000 feet. The vegetation is Douglas-fir, white fir, limber pine, quaking aspen, Engelmann spruce, and mountain grasses. Precipitation is 22 to 27 inches, the mean annual soil temperature is 42° to 44° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is very dark grayish brown stony loam about 6 inches thick. It is covered by about 2 inches of decomposed forest litter. The subsurface layer is brown stony loam about 6 inches thick. The subsoil is brown and reddish brown clay and clay loam about 19 inches thick. The substratum is reddish brown gravelly sandy clay about 22 inches thick. The depth to basalt bedrock is 53 inches. Soil reaction is slightly acid in the surface and subsurface layers, neutral and slightly acid in the subsoil, and mildly alkaline in the substratum.

The soil is very slowly permeable. Available water capacity is 7 to 8 inches. Effective rooting depth is 40 to 60 inches.

Burnac soils are used for woodland, wildlife habitat, watershed, and recreation.

Representative profile of Burnac stony loam in an area of Burnac-Hillery association, sloping, approximately 6 miles east-northeast of Black Lake, 2,025 feet south and 1,850 feet west of the northeast corner of sec. 8, T. 25 N., R. 17 E.

O1&O2—2 inches to 0; decomposed and decomposing forest litter.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) stony loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; few fine tubular and common fine interstitial pores; 20 percent stones; slightly acid; clear smooth boundary.

A2—6 to 12 inches; brown (7.5YR 5/4) stony loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky and moderate very fine granular structure; hard dry, firm moist, slightly sticky and slightly plastic wet; many fine, medium, and coarse roots; many fine tubular pores; 25 percent stones; slightly acid; abrupt wavy boundary.

B21t—12 to 17 inches; brown (7.5YR 5/4) clay, reddish brown (5YR 4/3) moist; strong fine and medium angular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; many medium and coarse roots; few fine tubular pores; many moderately thick clay films on peds; 5 percent gravel; slightly acid; clear wavy boundary.

B22t—17 to 26 inches; reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure parting to strong medium angular blocky; very hard dry, extremely firm moist, sticky and very plastic wet; common fine and few coarse roots; continuous thick clay films on peds; 5 percent gravel; slightly acid; clear wavy boundary.

B23t—26 to 31 inches; reddish brown (2.5YR 5/4) clay loam, reddish brown (2.5YR 4/4) moist; moderate medium angular blocky structure; very hard dry, extremely firm moist, slightly sticky and very plastic wet; few very fine roots; few very fine tubular pores; many thick clay films on peds; 5 percent gravel and cobbles; neutral; clear wavy boundary.

C—31 to 53 inches; reddish brown (5YR 5/4) gravelly sandy clay, reddish brown (5YR 4/4) moist; massive; very hard dry, very firm moist, slightly sticky and plastic wet; 45 percent gravel, cobbles, and stones; mildly alkaline; abrupt wavy boundary.

R—53 inches; basalt rock.

Rock fragments are basalt and range in size from gravel to stones. The A1 horizon has hue of 10YR or 7.5YR, value of 3 through 5 dry and 2 or 3 moist, and chroma of 2 or 3 moist. It is loam or silt loam that is 15 to 30 percent rock fragments. The A2 horizon has

hue of 7.5YR or 5YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry. It is loam or silt loam that is 15 to 20 percent rock fragments. The B2t horizon has hue of 2.5YR through 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4 dry and moist. It is clay or heavy clay loam that is 0 to 10 percent rock fragments. The depth to bedrock ranges from 40 to 60 inches.

BY—Burnac-Hillery association, sloping. This mapping unit is on basalt mesas and basalt flows at elevations of 8,200 to 11,000 feet. It is about 65 percent a Burnac stony loam that has slopes of 1 to 15 percent and about 25 percent a Hillery silt loam that has slopes of 1 to 15 percent. The Burnac soil is on the stonier positions, and the Hillery soil is on the smoother, grassed positions.

About 10 percent of this mapping unit is included areas of Rock outcrop, Hillery stony loam, and Saladon soils. Rock outcrop is throughout the unit. Hillery stony loam is in the stonier grassed areas, and Saladon soils are in swales.

Burnac stony loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Hillery silt loam has a profile similar to the one described as representative of the series, but it has a silt loam surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for woodland, range, wildlife habitat, recreation, and watershed. Burnac stony loam in capability subclass VIIs dryland; woodland suitability group 6o2. Hillery silt loam in capability subclass VIe dryland; Subalpine Grassland range site.

Capulin Series

The Capulin series consists of deep, well drained soils on fans and valley side slopes. These soils formed mostly in material weathered from basalt and eolian materials. Slopes are 1 to 7 percent. Elevation is 6,000 to 7,500 feet. The vegetation is blue grama, western wheatgrass, and buffalograss. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown silt loam and silty clay loam about 9 inches thick. The subsoil is grayish brown and light brownish gray clay loam about 18 inches thick. The substratum is very pale brown and light gray clay loam and silty clay loam. Soil reaction is mildly alkaline to moderately alkaline throughout.

The soil is moderately permeable. Available water capacity is 6 to 13 inches. Effective rooting depth is 60 inches or more.

Capulin soils are used for range, wildlife habitat, watershed, and recreation.

Representative profile of Capulin silt loam in an area of Capulin-Torreon association, moderately sloping, 1,300 feet south and 55 feet east of the northwest corner of sec. 27, T. 28 N., R. 27 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

A3—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse granular structure; hard dry, friable moist, sticky and plastic wet; many fine and very fine roots; common medium and fine tubular pores; slightly calcareous; moderately alkaline; clear smooth boundary.

B21t—9 to 16 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; hard dry, friable moist, sticky and plastic wet; common fine roots; few medium tubular pores; common thin clay films on peds; strongly calcareous; moderately alkaline; clear smooth boundary.

B22t—16 to 27 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard dry, friable moist, sticky and plastic wet; common fine roots; few fine tubular pores; many thin clay films on peds; strongly calcareous; few fine threads of lime; moderately alkaline; clear wavy boundary.

C1ca—27 to 49 inches; very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard dry, friable moist, slightly sticky and plastic wet; few fine roots; few fine tubular pores; strongly calcareous; common fine threads and fine soft masses of lime; moderately alkaline; clear smooth boundary.

C2ca—49 to 67 inches; light gray (10YR 7/2) silty clay loam, brown (10YR 5/3) moist; massive; slightly hard dry, friable moist, slightly sticky and plastic wet; few fine tubular pores; strongly calcareous; common fine soft masses of lime; moderately alkaline.

The thickness of the solum ranges from 23 to 35 inches.

Basalt rock fragments are 0 to 10 percent of the A and B2t horizons and 0 to 15 percent of the Cca horizon. Some pedons are calcareous at the surface. The A horizon has value of 4 or 5 dry and chroma of 2 or 3. It is silt loam, loam, or silty clay loam. The B2t horizon has value of 5 or 6 dry and 3 through 5 moist and chroma of 2 or 3. It is clay loam or silty clay loam. The Cca horizon has value of 5 or 6 moist and chroma of 2 or 3. It is clay loam, silty clay loam, loam, or silt loam. Some areas have basalt between 40 and 60 inches.

CaD—Capulin-Ayon complex, 1 to 9 percent slopes. This mapping unit is on basalt uplands at elevations of 6,000 to 7,500 feet. It is about 60 percent a Capulin

silt loam that has slopes of 1 to 7 percent and 20 percent an Ayon cobbly silt loam that has slopes of 3 to 9 percent. The Capulin soil is on smooth areas throughout the complex, and the Ayon soil is on fans near the lower edges of the complex.

About 10 percent of this mapping unit is included areas of Apache cobbly loam that has slopes of 1 to 9 percent and 10 percent La Brier and Torreon soils and Rock outcrop. The Apache soil and Rock outcrop are throughout the complex. The La Brier and Torreon soils are in depressions and drainageways.

Capulin silt loam has a profile similar to the one described as representative of the series, but it has a slightly lighter colored surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Ayon cobbly silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, watershed, and recreation. Capability subclass VIs dryland. Capulin soil in Loamy range site. Ayon soil in Malpais range site.

CB—Capulin-Torreon association, moderately sloping. This mapping unit is on fans and valley fill on and near basalt flows at elevations of 6,000 to 7,500 feet. It is about 50 percent a Capulin silt loam that has slopes of 1 to 7 percent and about 35 percent a Torreon silt loam that has slopes of 0 to 5 percent. The Capulin soil is on alluvial fans and valley fills, and the Torreon soil is on flatter areas on fans.

About 15 percent of this mapping unit is included areas of Apache, Thunderbird, Ayon, and La Brier soils. The Apache, Thunderbird, and Ayon soils are on ridges. The La Brier soils are in swales and around small intermittent lakes.

Capulin silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Torreon silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, watershed, and recreation. Capability subclass VIe dryland; Loamy range site.

Carnero Series

The Carnero series consists of moderately deep, well drained soils on uplands. These soils formed in mixed eolian deposits and residuum derived from sandstone. Slopes are 0 to 5 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, wolftail, three-awn, hairy grama, and broom snakeweed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 55° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is grayish brown loam about 6 inches thick. The subsoil is yellowish brown and brown clay loam and clay about 32 inches thick. Sandstone is at a depth of 38 inches. Soil reaction is mildly alkaline in the surface layer and neutral to moderately alkaline in the subsoil.

The soil is slowly permeable. Available water capacity is 5 to 8 inches. Effective rooting depth is 20 to 40 inches.

Carnero soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Carnero loam in an area of Carnero-Partri association 1,330 feet west and 10 feet south of the northeast corner sec. 3, T. 25 N., R. 27 E.

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak thick platy and weak very fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

B1t—6 to 10 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong very fine angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; many fine and very fine roots; common very fine tubular pores; few thin clay films on peds; neutral; clear smooth boundary.

B21t—10 to 17 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; strong medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and very fine roots; common very fine tubular pores; many thick clay films on peds; mildly alkaline; clear smooth boundary.

B22t—17 to 25 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; moderate medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine and very fine roots; few very fine tubular pores; many moderately thick clay films on peds; strongly calcareous; 5 percent fine and medium soft masses of lime; moderately alkaline; gradual smooth boundary.

B23t—25 to 38 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure; hard dry, firm moist, sticky and plastic wet; very few fine and very fine roots; many very fine tubular pores; common thin clay films on peds; strongly calcareous; few fine masses and mycelia of lime; moderately alkaline; abrupt wavy boundary.

R—38 inches; hard sandstone.

Rock fragments are angular sandstone gravel or cobbles. They are 0 to 5 percent of the A1 and B1t horizons and 0 to 10 percent of the B2t horizon. Soil reaction ranges from neutral to mildly alkaline in the A1 and B1t horizons and from mildly alkaline to moderately alkaline in the B2t horizon. The A1 horizon has chroma of 2 or 3. It is loam or silt loam. The B2t horizon has hue of 10YR to 7.5YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4. It is clay, clay loam, or silty clay. The depth to sandstone ranges from 20 to 40 inches.

CP—Carnero-Partri association. This mapping unit

is on uplands at elevations of 6,000 to 7,000 feet. Slopes are 0 to 9 percent. This unit is about 40 percent a Carnero loam that has slopes of 0 to 5 percent, 30 percent a Partri silt loam that has slopes of 0 to 3 percent, and 15 percent a Dioxice loam that has slopes of 1 to 5 percent. The Carnero soil is on broad upland fans. The Partri soil is in swales and valleys. The Dioxice soil is on fans along drainageways.

About 15 percent of this mapping unit is included areas of Bernal soils, La Brier and Manzano soils, and Travessilla soils and Rock outcrop. The Bernal soils are along low ridges. The La Brier and Manzano soils are along drainageways. The Travessilla soils and Rock outcrop are throughout the association, usually at the higher positions on the landscape.

Carnero loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Partri silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Dioxice loam has a profile similar to the one described as representative of the series, but it has a loam surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Loamy range site.

Cinder Land

Cinder land consists mainly of gravel-size, porous, rounded volcanic rock fragments to a depth of 60 inches or more. Slopes are 25 to 50 percent. Elevation is 7,000 to 9,000 feet. Precipitation is 15 to 20 inches, the mean annual soil temperature is 41° to 45° F, and the frost-free season is 100 to 120 days.

Cinder land is used for construction material, landscaping, and watershed. It is mapped only with Bandera soils.

Colmor Series

The Colmor series consists of deep, well drained soils on uplands. These soils formed in fine textured alluvium and residuum derived from shale. Slopes are 0 to 9 percent. Elevation is 5,800 to 7,500 feet. The vegetation is blue grama, galleta, and sand dropseed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is grayish brown silt loam and silty clay loam about 14 inches thick. The subsoil is pale brown and light yellowish brown silty clay loam about 18 inches thick. The substratum is very pale brown silt loam and silty clay loam. Soil reaction is mildly alkaline in the surface layer and moderately alkaline in the subsoil.

The soil is moderately slowly permeable. Available water capacity is 11 to 15 inches. Effective rooting depth is 60 inches or more.

Colmor soils are used for irrigated crops, range, wildlife habitat, recreation, homesites, and watershed.

Representative profile of Colmor silt loam in an area of Colmor association 50 feet west and 3,630 feet south of the northeast corner of sec. 25, T. 26 N., R. 24 E.

A11—0 to 4 inches; grayish brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; few fine tubular and common fine interstitial pores; calcareous; mildly alkaline; clear smooth boundary.

A12—4 to 14 inches; grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; few fine tubular and common fine interstitial pores; calcareous; mildly alkaline; clear smooth boundary.

B2—14 to 25 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard dry, firm moist, slightly sticky and slightly plastic wet; common fine roots; common medium tubular pores; calcareous; moderately alkaline; gradual smooth boundary.

B3ca—25 to 32 inches; light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard dry, friable moist, slightly sticky and slightly plastic wet; few fine roots; few fine tubular pores; calcareous; few fine irregular soft masses of segregated lime; moderately alkaline; gradual smooth boundary.

C1ca—32 to 52 inches; very pale brown (10YR 8/4) silt loam, light yellowish brown (10YR 6/4) moist; massive; hard dry, friable moist, slightly sticky and plastic wet; very few fine roots; few fine tubular pores; calcareous; lime disseminated and decreasing with depth; moderately alkaline; gradual smooth boundary.

C2ca—52 to 64 inches; very pale brown (10YR 8/3) silty clay loam, brown (10YR 5/3) moist; massive; hard dry, firm moist, sticky and plastic wet; very few fine roots; few very fine vesicular pores; calcareous; lime disseminated; moderately alkaline.

The A1 horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3 dry and moist. It is silt loam, loam, or silty clay loam. The B2 horizon has value of 4 through 6 dry and 4 or 5 moist and chroma of 2 through 4 dry and moist. It is silty clay loam, clay loam, or silt loam. The B3ca horizon has value of 5 through 7 dry and 4 through 6 moist and chroma of 2 through 4 dry and moist. It is silty clay loam or clay loam. The Cca horizon has value of 5 through 8 dry and 4 through 6 moist and chroma of 2 through 4 dry and moist. The texture is loam, silt loam, or silty clay loam.

CrB—Colmor silt loam, 1 to 3 percent slopes. This nearly level soil is on fans at elevations of 5,900 to 7,000 feet.

About 20 percent of this mapping unit is included areas of Colmor silty clay loam that has slopes of less than 5 percent and Colmor silt loam that has slopes of less than 1 percent and greater than 3 percent. They occur throughout the mapping unit.

Colmor silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for irrigated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIe-6 irrigated, subclass VIe dryland; Loamy range site.

CrC—Colmor silt loam, 3 to 5 percent slopes. This gently sloping soil is on fans at elevations of 5,900 to 6,400 feet.

About 10 percent of this mapping unit is included areas of Colmor silt loam that has slopes of less than 3 percent and Colmor silty clay loam that has slopes of less than 5 percent. They occur throughout the mapping unit.

Colmor silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for irrigated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIIe-1 irrigated, subclass VIe dryland; Loamy range site.

CsB—Colmor silty clay loam, 1 to 3 percent slopes. This nearly level soil is on fans at elevations of 5,900 to 7,000 feet.

About 20 percent of this mapping unit is included areas of Colmor silt loam that has slopes of less than 5 percent and Colmor silty clay loam that has slopes less than 1 percent and greater than 3 percent. They occur throughout the mapping unit.

Colmor silty clay loam has a profile similar to the one described as respective of the series, but the surface layer is silty clay loam. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for irrigated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIe-6 irrigated, subclass VIe dryland; Clayey range site.

CsC—Colmor silty clay loam, 3 to 5 percent slopes. This gently sloping soil is on fans at elevations of 5,900 to 7,000 feet.

About 20 percent of this mapping unit is included areas of Colmor silt loam that has slopes of less than 5 percent and Colmor silty clay loam that has slopes of less than 3 percent. They occur throughout the mapping unit.

Colmor silty clay loam has a profile similar to the one described as representative of the series, but it has a silty clay loam surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for irrigated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIIe-1 irrigated, subclass VIe dryland; Clayey range site.

CT—Colmor association. This mapping unit is on uplands at elevations of 6,000 to 7,000 feet. Slopes are 0 to 5 percent. This unit is about 65 percent of Colmor silt loam that has slopes of 0 to 5 percent and about 20 percent a soil similar to but lighter colored than the Colmor soil. These soils occur throughout this unit. The Colmor soil is generally on the smoother parts.

About 15 percent of this mapping unit is included areas of La Brier, Litle, Mion, Penrose, Swastika, and Vermejo soils. La Brier and Vermejo soils are on lower flats and in swales. Litle, Mion, and Swastika soils are on the middle parts. Penrose soils are generally on the highest parts of this unit.

Colmor silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, recreation, homesites, and watershed. Capability subclass VIe dryland; Loamy range site.

CV—Colmor-Vermejo-Litle association, sloping. This mapping unit is on alluvial fans below shale and sandstone escarpments and breaks at elevations of 5,800 to 7,400 feet. It is about 35 percent a Colmor silt loam that has slopes of 3 to 9 percent, 30 percent a Vermejo silty clay loam that has slopes of 1 to 3 percent, and 20 percent a Litle silty clay that has slopes of 1 to 5 percent. The Colmor soil is on convex areas. The Vermejo soil is in the smoother, lower areas. The Litle soil occurs throughout this unit.

About 15 percent of this mapping unit is included areas of Mion and La Brier soils, Rock outcrop, and shaly alluvium. The Mion soils and Rock outcrop are on the higher parts of the associations. The La Brier soils and shaly alluvium are in swales. Areas where gully erosion is moderate and severe are included throughout this mapping unit.

Colmor silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Vermejo silty clay loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Litle silty clay has a profile similar to the one described as representative of the series, but it has a silty clay surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Capability subclass VIe dryland. Colmor soil in Loamy range site, Vermejo and Litle soils in Clayey range site.

Cumulic Haplaquolls

The Cumulic Haplaquolls are a group of closely related, very poorly drained soils in swales and on wet mountain meadows. These soils formed in mixed alluvium from intrusive and sedimentary rocks. Slopes are 1 to 5 percent. Elevation is 7,500 to 9,500 feet. The vegetation is Kentucky bluegrass, clovers, sedges, and iris. Precipitation is 16 to 19 inches, the mean annual soil temperature is about 46° F, and the frost-free season is less than 90 days.

Typically, the surface layer is very dark gray to dark grayish brown, stratified mucky loam to clay about 30 inches thick. The underlying material is mottled, grayish brown stratified clay loam to clay. Discontinuous lenses of sand and gravel occur throughout the profile. Soil reaction is mildly alkaline to moderately alkaline. The water table fluctuates within 3 feet of the surface.

Cumulic Haplaquolls are used for summer range, wildlife, recreation, and watershed.

Cumulic Haplaquolls are mapped only as part of the Frolic association.

Cypher Series

The Cypher series consists of shallow, well drained soils on steep, convex mountainsides and ridgecrests. These soils formed in colluvium, alluvium, and residuum derived mostly from intrusive rocks. Slopes are 10 to 50 percent. Elevation is 7,500 to 10,500 feet. The vegetation is Douglas-fir, white fir, limber pine, scattered ponderosa pine, kinnikinnick, Arizona fescue, mountain muhly, and mountain brome. Precipitation is 22 to 27 inches, the mean annual soil temperature is about 40° to 44° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown gravelly loam about 4 inches thick covered with about 1 inch of decomposing forest litter. The subsoil is yellowish brown gravelly loam about 9 inches thick. The substratum is pale brown gravelly sandy loam about 6 inches thick. Intrusive bedrock is at a depth of 19 inches. Soil reaction is slightly acid in the surface layer and medium acid in the subsoil.

The soil is moderately permeable. Available water capacity is 1 to 2 inches. Effective rooting depth is 10 to 20 inches.

Cypher soils are used for wildlife habitat, recreation, woodland, and watershed.

Representative profile of Cypher gravelly loam in an area of Cypher-Bundo association, steep, about 11 miles north northwest of Eagle Nest or 2,690 feet south and 500 feet east of the junction of New Mexico State Highway 38 at the Taos County line:

O1&O2—1 inch to 0; decomposed and undecomposed forest litter.

A1—0 to 4 inches; (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft dry, very friable moist; common medium and coarse roots; many fine interstitial pores; 15 percent gravel; slightly acid; clear wavy boundary.

B2—4 to 13 inches; yellowish brown (10YR 5/4) gravelly loam, brown (7.5YR 4/2) moist; weak very fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common medium and coarse roots; few fine tubuular pores; 40 percent gravel; medium acid; gradual wavy boundary.

C—13 to 19 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (7.5YR 4/4) moist; massive; soft dry, very friable moist; common medium and coarse roots; common medium tubular pores; 50 percent gravel; medium acid; abrupt wavy boundary.

R—19 inches; intrusive acid igneous bedrock fractured in the upper few inches.

Rock fragments are angular gravel with scattered cobbles and stones. The A1 horizon has hue of 7.5YR or 10YR, value of 3 through 5 dry and 2 through 4 moist, and chroma of 2 through 4. It is a loam or sandy loam that is 5 to 35 percent gravel. The B2 horizon has hue of 7.5YR or 10YR, value of 5 through 7 dry and 4 or 5 moist, and chroma of 2 through 4. It is a loam or sandy loam that is 40 to 65 percent gravel. The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 6 or 7 dry and 4 or 5 moist, and chroma of 2 through 4. It is loam or sandy loam that is 40 to 65 percent gravel. The depth to bedrock ranges from 10 to 20 inches.

CY—Cypher-Bundo association, steep. This mapping unit is on mountainsides of the Cimarron and Sangre de Cristo Mountains at elevations of 8,000 to 10,500 feet. It is about 50 percent a Cypher gravelly loam that has slopes of 25 to 50 percent and about 40 percent a Bundo gravelly sandy loam that has slopes of 35 to 45 percent. The Cypher soil is on ridgetops and mountainsides. The Bundo soil is on mountainsides.

About 10 percent of this mapping unit is included areas of Tolby and Angostura soils, Rock outcrop, and Rubble land. Tolby and Angostura soils are near the upper limits of this mapping unit. Rock outcrop is throughout this unit. Rubble land is below the Rock outcrop.

Cypher gravelly loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Bundo gravelly sandy loam has a profile similar to the one described as representative of the series, but it has a thinner forest litter and is deeper to the subsoil. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for recreation, wildlife habitat, woodland, and watershed. Capability subclass VIIe dryland. Cypher soil in woodland suitability group 6d2, Bundo soil in 6f1.

Dalcan Series

The Dalcan series consists of moderately deep, well drained soils on mesas. These soils formed in residuum and colluvium derived mostly from basalt. Slopes are 3 to 9 percent. Elevation is 7,200 to 9,000 feet. The vegetation is Arizona fescue, Kentucky bluegrass, blue grama, Gambel oak, and scattered ponderosa pine. Mean annual precipitation is 16 to 20 inches, the mean annual soil temperature is 42° to 45° F, and the frost-free season is 80 to 120 days.

In a representative profile, the surface layer is brown stony silt loam about 4 inches thick. The subsoil is reddish brown and brown stony silt loam, stony clay loam, and stony clay about 30 inches thick. The depth to basalt is 34 inches. Soil reaction is neutral to slightly acid throughout the profile.

The soil is slowly permeable. Available water capacity is 2 to 4 inches. Effective rooting depth is 21 to 40 inches.

Dalcan soils are used for range, wildlife habitat, recreation, and watershed. They are mapped only with Raton soils.

Representative profile of Dalcan stony silt loam in an area of Raton-Dalcan association, rolling, about 25 miles west of Springer on west side of road, 200 feet south of the benchmark, which is 0.6 mile south-southeast of White Peak Lookout Tower:

A1—0 to 4 inches; brown (7.5YR 4/2) stony silt loam, dark brown (7.5YR 3/2) moist; weak very fine granular structure; soft dry, friable moist; many very fine and common fine roots; many very fine interstitial pores; 30 percent basalt stones and cobbles; neutral; abrupt wavy boundary.

B1t—4 to 9 inches; reddish brown (5YR 5/3) stony silt loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard dry, friable moist, slight sticky wet; many fine and very fine roots; few very fine tubular pores; few thin clay films on peds; 10 percent gravel, 10 percent cobbles, 10 percent stones; slightly acid; abrupt wavy boundary.

B21t—9 to 17 inches; brown (7.5YR 5/2) stony clay loam, dark brown (7.5YR 3/3) moist; moderate fine and medium subangular blocky structure; hard dry, firm moist, slightly sticky and slightly plastic wet; few very fine roots; few very fine tubular pores; few thin clay films on peds and rock fragments; 65 percent stones; neutral; clear irregular boundary.

B22t—17 to 34 inches; reddish brown (5YR 5/3) stony clay, dark reddish brown (5YR 3/3) moist; moderate fine and medium subangular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; very few fine roots; few very fine tubular pores; common moderately thick clay films on peds and stones; 65 percent basalt stones; neutral; abrupt wavy boundary.

R—34 inches; basalt bedrock, fractured and weathered.

Rock fragments are basalt and range in size from pebbles to stones. The A1 horizon has hue of 10YR or 7.5YR and value of 3 or 4 dry and 2 or 3 moist. It is silt loam, loam, or clay loam that is 30 to 50 percent rock fragments. The B2t horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 through 5 dry and 2 or 3 moist, and chroma of 2 through 4. It is clay loam and clay that is 40 to 70 percent rock fragments. The depth to bedrock ranges from 21 to 40 inches.

Dalhart Series

The Dalhart series consists of deep, well drained soils on uplands. These soils formed in eolian material. Slopes are 0 to 5 percent. Elevation is 5,800 to 6,800 feet. The vegetation is blue grama, sand dropseed, three-awn, and yucca. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is yellowish brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown and pale brown sandy clay loam about 23 inches thick. The substratum is pale brown sandy clay loam and fine sandy loam. Soil reaction is neutral in the surface layer, mildly alkaline to moderately alkaline in the subsoil, and moderately alkaline in the substratum.

The soil is moderately permeable. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more.

Dalhart soils are used for irrigated crops, range, wildlife habitat, and watershed.

Representative profile of Dalhart fine sandy loam in an area of Dalhart-Seelez association, gently sloping, 1,885 feet east and 1,990 feet north of the southwest corner of sec. 33, T. 27 N., R. 23 E.

A11—0 to 2 inches; yellowish brown (10YR 5/4) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft dry, very friable moist; many fine and very fine roots; few fine tubular pores; neutral; clear smooth boundary.

A12—2 to 5 inches; yellowish brown (10YR 5/4) fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft dry, very friable moist, slightly plastic wet; many fine and very fine roots; few fine tubular pores; neutral; clear smooth boundary.

B21t—5 to 14 inches; yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard dry, firm moist, slightly sticky and plastic wet; common fine and very fine roots; few fine tubular pores; common thin clay films on peds; mildly alkaline; clear smooth boundary.

B22t—14 to 18 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure; hard dry, firm moist, slightly sticky and plastic wet; very few fine roots; common fine tubular pores; common thin clay films on peds; mildly alkaline; clear smooth boundary.

B3ca—18 to 28 inches; pale brown (10YR 6/3) light sandy clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; very few fine roots; common very fine tubular pores; strongly calcareous; common fine filaments of lime; moderately alkaline; gradual smooth boundary.

Cca—28 to 51 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft dry, very friable moist; few very fine tubular pores; strongly calcareous; few fine filaments of lime; moderately alkaline; gradual smooth boundary.

IIB2ca—51 to 60 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3)

moist; weak coarse subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; many very fine tubular pores; strongly calcareous; common fine filaments of lime; moderately alkaline.

The A horizon has value of 4 or 5 dry and 3 or 4 moist and chroma of 2 through 4. It is fine sandy loam, sandy loam, or loamy sand. The B2t horizon has hue of 10YR to 7.5YR, value of 4 through 6 dry, and chroma of 2 through 4. It is sandy clay loam or heavy sandy loam.

DaB—Dalhart fine sandy loam, 1 to 3 percent slopes. This nearly level soil is on uplands at elevations of 5,800 to 6,800 feet.

About 10 percent of this mapping unit is included areas of Seelez and Swastika soils. The Seelez soil is throughout the map unit. The Swastika soil is in depressions and on flat areas.

Dalhart fine sandy loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This mapping unit is used for irrigated crops, range, wildlife habitat, and watershed. Capability unit IIIe-4 irrigated, subclass VIe dryland; Sandy range site.

DaC—Dalhart fine sandy loam, 3 to 5 percent slopes. This gently sloping soil is on uplands at elevations of 5,800 to 6,800 feet.

About 10 percent of this mapping unit is included areas of Dalhart fine sandy loam that has slopes of 5 to 9 percent and Seelez, Swastika, and wind deposited soils with shale at depths of less than 40 inches. The Dalhart soil is adjacent to drainageways. The Seelez and Swastika soils are throughout the mapping unit. The wind deposited soils are on buried ridges and slope breaks.

Dalhart fine sandy loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This unit is used for range, irrigated crops, wildlife habitat, and watershed. Capability unit IIIe-4 irrigated, subclass VIe dryland; Sandy range site.

DB—Dalhart-Seelez association, gently sloping. This mapping unit is on grassed uplands at elevations of 5,800 to 6,800 feet. It is on the northeast, downwind side of major drainageways and is about 60 percent a Dalhart fine sandy loam with slopes of 0 to 3 percent and 25 percent a Seelez fine sandy loam with slopes of 2 to 5 percent. The Dalhart soils are on the smoother areas. The Seelez soils are on the more sloping areas.

About 15 percent of this mapping unit is included areas of Swastika, Mion, Litle, and Tinaja soils. The Swastika soils are throughout the mapping unit. The Mion, Litle, and Tinaja soils are on ridges and along drainageways. These soils mostly have a sandy loam surface layer.

Dalhart fine sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. Seelez fine sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Sandy range site.

Dallam Series

The Dallam series consists of deep, well drained soils on uplands. These soils formed in medium and moderately coarse textured eolian material. Slopes are 0 to 5 percent. Elevations are 6,000 to 6,500 feet. The vegetation is blue grama, sand dropseed, and threeawn. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil to a depth of 75 inches is brown, light brown, and very pale brown clay loam and sandy clay loam. Soil reaction is mildly alkaline in the surface layer and upper part of the subsoil and moderately alkaline in the lower part of the subsoil.

The soil is moderately permeable. Available water capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more.

Dallam soils are used for dryland crops, range, wildlife habitat, and watershed.

Representative profile of Dallam fine sandy loam, 0 to 3 percent slopes, 120 feet south and 70 feet east of the northwest corner sec. 14, T. 24 N., R. 27 E.

A1—0 to 5 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; soft dry, very friable moist; many fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

B21t—5 to 19 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; hard dry, friable moist, slightly sticky and slightly plastic wet; common fine roots; common fine and few medium tubular pores; many thin clay films on peds; mildly alkaline; gradual wavy boundary.

B22t—19 to 36 inches; light brown (7.5YR 6/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; hard dry, friable moist, slightly sticky and slightly plastic wet; few fine roots; common fine tubular pores; many thin clay films on peds; slightly calcareous in lower 2 inches; mildly alkaline; clear wavy boundary.

B23tca—36 to 75 inches; very pale brown (10YR 8/3) sandy clay loam, light gray (10YR 7/2) moist; massive; slightly hard dry, friable moist, slightly plastic wet; few fine rounded igneous gravels; strongly calcareous; moderately alkaline.

The A horizon has hue of 7.5YR to 10YR, value of 3 to 4 moist, and chroma of 2 through 4. It is fine sandy

loam or loamy fine sand. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 4 through 6. The B23tca horizon has hue of 10YR, 7.5YR, or 5YR, value of 6 through 8 dry and 5 through 7 moist, and chroma of 2 through 6. It is sandy clay loam or clay loam.

DmB—Dallam loamy fine sand, 0 to 3 percent slopes. This nearly level to gently undulating soil is on uplands at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Gruver, Dioxice, and Texline soils. Gruver soils are along the edges of delineations. Dioxice and Texline soils are on small knolls and the more sloping positions.

Dallam loamy fine sand has a profile similar to the one described as representative of the series, but it has a loamy fine sand surface layer. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IVe–3 dryland; Deep Sand range site.

DmC2—Dallam loamy fine sand, 1 to 5 percent slopes, eroded. This gently undulating to undulating soil is in formerly cultivated fields on uplands.

About 15 percent of this mapping unit is included areas of Dallam fine sandy loam and Seelez, Gruver, Dioxice, and Texline soils. Dallam fine sandy loam and Gruver soils are along the edges of delineations. Dioxice and Texline soils are on small knolls. The Seelez soil occurs throughout the mapping unit.

Dallam loamy fine sand, eroded, has a profile similar to the one described as representative of the series, but it has a loamy fine sand surface layer. The original surface layer and commonly part of the subsoil have been reworked by soil blowing. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Deep Sand range site.

DnB—Dallam fine sandy loam, 0 to 3 percent slopes. This nearly level to gently undulating soil is on uplands at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Dallam loam and Gruver, Dioxice, and Texline soils. Dallam loam and Gruver soils are along the edges of delineations. Dioxice and Texline soils are on small knolls. Areas of more sloping Dallam fine sandy loam are also included.

Dallam fine sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IIIe–3 dryland; Sandy range site.

DnB2—Dallam fine sandy loam, 0 to 3 percent slopes, eroded. This nearly level to gently undulating soil is in formerly cultivated fields on uplands. It consists of deposits of fine sandy loam and blowouts of sandy clay loam.

About 15 percent of this mapping unit is included areas of uneroded Dallam fine sandy loam and Gruver, Dioxice, and Texline soils. Dallam fine sandy loam is in small uneroded areas. Dioxice and Texline soils are on small knolls. Gruver soils are along the edges of delineations.

Dallam fine sandy loam, eroded, has a profile similar to the one described as representative of the series, but it has a stratified surface layer. The surface layer and commonly all or part of the subsoil have been reworked by soil blowing. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Sandy range site.

Dargol Series

The Dargol series consists of moderately deep, well drained soils on ridges, mesas, and convex mountainsides. These soils formed in stony, fine textured residuum derived from interbedded sandstone and shale. Slopes are 3 to 30 percent. Elevation is 7,000 to 9,000 feet. The vegetation is ponderosa pine, scattered Douglas-fir, scattered pinyon pine, and scattered Rocky Mountain juniper and an understory of Gambel oak, mountainmahogany, Arizona fescue, pine dropseed, prairie junegrass, and mountain muhly. Precipitation is 18 to 22 inches, the mean annual soil temperature is 43° to 46° F, and the frost-free season is 100 to 120 days.

In a representative profile, the surface layer is very pale brown stony loam about 6 inches thick. It is covered with about 2 inches of decomposing forest litter. The subsoil is a reddish yellow and light yellowish brown clay about 29 inches thick. The depth to sandstone is 35 inches. Soil reaction is slightly acid to medium acid.

The soil is very slowly permeable. Available water capacity is 5 to 6 inches. Effective rooting depth is 20 to 40 inches.

Dargol soils are used for range, woodland, wildlife habitat, recreation, and watershed.

Representative profile of Dargol stony loam in an area of Dargol-Stout-Vamer association, sloping, about 18 miles west of Raton or 2.4 miles west of Armstrong Lookout along York Canyon Road and 70 yards north of road:

O1&O2—2 inches to 0; decomposed and decomposing forest litter.

A2—0 to 6 inches; very pale brown (10YR 7/3) stony loam, brown (10YR 5/3) moist; weak thin platy structure; slightly hard dry, very friable moist, slightly sticky and slightly plastic wet; common fine and coarse roots; common fine tubular pores; 10 percent angular cobbles and stones; slightly acid; gradual wavy boundary.

B21t—6 to 15 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; many large distinct mottles of yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4) moist; strong fine and medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; many

medium and coarse roots; few fine tubular pores; many thick clay films on peds; 10 percent angular cobbles; medium acid; gradual wavy boundary.

B22t—15 to 35 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; many medium distinct mottles of light brownish gray (10YR 6/2); strong fine and medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few medium and coarse roots; few very fine tubular pores; many thick clay films on peds; 10 percent angular cobbles; medium acid; abrupt wavy boundary.

R—35 inches; yellowish brown (10YR 5/4) slightly weathered, fine grained sandstone.

Rock fragments are angular sandstone and shale and range in size from gravel to stone. The A2 horizon has value of 4 through 7 dry and 3 through 5 moist, and chroma of 2 through 4 dry and moist. It is loam, very fine sandy loam, sandy loam, or clay loam that is 5 to 20 percent rock fragments. The B21t horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 through 5 moist, and chroma of 3 through 6 dry and moist. It is clay, silty clay, clay loam, or silty clay loam that is 5 to 20 percent rock fragments. The B22t horizon has hue of 7.5YR through 2.5Y, value of 5 or 6 dry and 4 or 5 moist, and chroma of 4 through 6 dry and moist. It is clay, silty clay, clay loam, or silty clay loam that is 5 to 20 percent rock fragments. The depth to bedrock ranges from 20 to 40 inches.

DO—Dargol-Stout-Vamer association, sloping. This mapping unit is on mesa tops and ridgetops at elevations of 7,300 to 9,000 feet. It is about 40 percent a Dargol stony loam that has slopes of 3 to 9 percent, 30 percent a Stout cobbly sandy loam that has slopes of 1 to 9 percent, and 20 percent a Vamer stony very fine sandy loam that has slopes of 2 to 9 percent. The Dargol soil is on the smoother, wooded areas. The Stout soil is on the rougher, more complex wooded areas. The Vamer soil is on ridgecrests.

About 10 percent of this mapping unit is included areas of Rock outcrop and Ponil, Fuera, Deacon, La Brier, and Manzano soils. Rock outcrop occurs throughout the mapping unit. Ponil and Fuera soils are on mountainsides. Deacon, La Brier, and Manzano soils are in small valleys.

Dargol stony loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Stout cobbly sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

Vamer stony very fine sandy loam has the profile described as representative of the series. Runoff is medium or rapid. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for woodland, summer range, wildlife habitat, recreation, and watershed. Capability subclass VIs dryland. Dargol soil in woodland suitability group 6o1, Stout soil in 6d1. Vamer soil in Mountain Grassland range site.

Deacon Series

The Deacon series consists of deep, well drained soils on fans and uplands. These soils formed in alluvium and colluvium derived from sandstone, shale, limestone, and basalt. Slopes are 1 to 9 percent. Elevation is 6,000 to 8,000 feet. The vegetation is blue grama, sideoats grama, ring muhly, western wheatgrass, and and fringed sagewort. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown loam about 10 inches thick. The subsoil is yellowish brown clay loam about 17 inches thick. The substratum is yellowish brown and light yellowish brown clay loam. Soil reaction is neutral in the surface layer, mildly to moderately alkaline in the subsoil, and moderately alkaline in the substratum.

The soil is moderately slowly permeable. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more.

Deacon soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Deacon loam in an area of Deacon-La Brier-Manzano association, sloping, about 18 miles northwest of Dawson or 140 feet west and 255 feet south of the western end of the northernmost stock tank:

A1—0 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

A3—5 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine roots; common fine tubular pores; neutral; clear smooth boundary.

B21—10 to 21 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard dry, firm moist, sticky and plastic wet; few fine and very fine roots; common very fine tubular pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B22ca—21 to 27 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/4) moist; weak medium prismatic structure; slightly hard dry, firm moist, sticky and plastic wet; very few very fine roots; few very fine tubular pores; strongly calcareous; common fine filaments of lime; moderately alkaline; clear smooth boundary.

C1ca—27 to 39 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard dry, friable moist, sticky and slightly plastic wet; very few very fine roots; few very fine tubular pores; strongly calcareous; common fine filaments of lime; moderately alkaline; gradual wavy boundary.

C2ca—39 to 60 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard dry, friable moist, sticky and slightly wet; very few very fine roots; common very fine tubular pores; strongly calcareous; common fine filaments of lime; moderately alkaline.

Rock fragments are sandstone, limestone, and basalt gravel, cobbles, and stones and are 0 to 10 percent of the profile. The A horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3. It is loam or silt loam. The B2 horizon has hue of 10YR to 7.5YR, value of 5 to 6 dry and 4 or 5 moist, and chroma of 2 through 4. It is clay loam or loam. The C horizon has value of 5 through 7 dry and 4 or 5 moist. It is clay loam, silty clay loam, or loam.

DP—Deacon-Ayon association, sloping. This mapping unit is on alluvial fans below basalt-capped mesas at elevations of 6,000 to 7,500 feet. It is about 65 percent a Deacon loam that has slopes of 1 to 9 percent and about 20 percent an Ayon cobbly silt loam that has slopes of 1 to 9 percent. The Deacon soil is throughout the mapping unit. The Ayon soil is on stony knolls and benches.

About 15 percent of this mapping unit is included areas of Capulin, Colmor, and Mion soils. Capulin soils are on the lower areas. Colmor soils are throughout this mapping unit. Mion soils are on ridges and knolls.

Deacon loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is medium to rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Ayon cobbly silt loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer and a higher proportion of cobbles. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Deacon soil in capability subclass VIe dryland, Loamy range site. Ayon soil in capability subclass VIs dryland, Malpais range site.

DR—Deacon-La Brier-Manzano association, sloping. This mapping unit is on grassed mountain valleys and narrow flats and in swales at elevations of 6,000 to 7,600 feet. It is about 35 percent a Deacon loam that has slopes of 3 to 9 percent, 35 percent a La Brier silt loam that has slopes of 1 to 3 percent, and 20 percent a Manzano loam that has slopes of 1 to 3 percent. The Deacon soil is on the higher positions. The La Brier soil is in swales. The Manzano soil is on the lower positions adjacent to the larger drainageways and is subject to infrequent flooding.

About 10 percent of this mapping unit is included areas of Dargol, Vamer, Ponil, and Midnight soils, Rock outcrop, and Riverwash. The Dargol and Vamer soils are at the edge of the mapping unit. The Ponil and Midnight soils and Rock outcrop are near drainage junction. The Riverwash is adjacent to and in the larger gullies.

Deacon loam has the profile described as representative of the series. Runoff is medium to rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

La Brier silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Manzano loam has a profile that is similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, recreation, irrigated crops, and watershed. Deacon soil in capability unit IIIe–1 irrigated, subclass VIe dryland; Loamy range site. La Brier soil in capability unit IIIe–8 irrigated, subclass IIIe–2 dryland; Loamy range site. Manzano soil in capability unit IIe–6 irrigated, subclass IIIe–1 dryland; Loamy range site.

DsE—Deacon-Oro Grande-Laporte complex, 3 to 15 percent slopes. This mapping unit is in valleys and on ridges at elevations of 7,000 to 8,000 feet. It is about 45 percent a Deacon loam that has slopes of 3 to 9 percent, 25 percent an Oro Grande gravelly loam that has slopes of 3 to 15 percent, and 15 percent a Laporte channery loam that has slopes of 3 to 15 percent. The Deacon soil is on fans and valley fills. The Oro Grande soil is on ridges over igneous dikes. The Laporte soil is in intermediate positions between the Deacon and Oro Grande soils.

About 15 percent of this mapping unit is included areas of Mion and La Brier soils and Rock outcrop. The Mion soils are on short hillsides. The La Brier soil is in drainageways. Rock outcrop is on ridgetops and igneous dikes.

Deacon loam has a profile similar to the one described as representative of the series, but it has a higher silt content throughout. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Oro Grande gravelly loam has a profile similar to the one described as representative of the series, but has a thinner surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Laporte channery loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Capability subclass VIIs dryland. Deacon soil in Loamy range site, Oro Grande and Laporte soils in Hills range site.

Des Moines Series

The Des Moines series consists of deep, well drained soils on mountainsides. These soils formed in alluvium

and residuum derived from mixed igneous rocks. Slopes are 15 to 45 percent. Elevation is 7,500 to 9,000 feet. The vegetation is Arizona fescue, mountain muhly, little bluestem, and blue grama and a thin overstory of pinyon pine, one-seed juniper, ponderosa pine, and limber pine. Precipitation is 15 to 20 inches, the mean annual soil temperature is 42° to 46° F, and the frost-free season is 90 to 120 days.

In a representative profile, the surface layer is dark grayish brown stony silt loam about 8 inches thick. The subsoil is brown stony clay and stony silty clay loam about 30 inches thick. The substratum is light brown very stony clay. Soil reaction is neutral throughout the profile.

The soil is slowly permeable. Available water capacity is 2 to 7 inches. Effective rooting depth is more than 60 inches.

Des Moines soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Des Moines stony silt loam in an area of Des Moines association, steep, 1,825 feet west and 2,000 feet north of the southeast corner of sec. 21, T. 27 N., R. 26 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) stony silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many fine interstitial pores; 40 percent gravel, cobbles, and stones; neutral; clear wavy boundary.

B1—8 to 12 inches; brown (7.5YR 4/2) stony silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; many fine interstitial pores; 25 percent gravel, cobbles, and stones; neutral; clear wavy boundary.

B21t—12 to 25 inches; brown (7.5YR 4/2) stony clay, dark brown (7.5YR 3/2) moist; moderate fine subangular and angular blocky structure; hard dry, firm moist, sticky and very plastic wet; many fine and very fine roots; common very fine tubular pores; 40 percent gravel, cobbles, and stones; neutral; clear irregular boundary.

B22t—25 to 38 inches; brown (7.5YR 5/4) stony clay, brown (7.5YR 4/4) moist; moderate fine angular blocky structure; very hard dry, firm moist, sticky and very plastic wet; few very fine roots; few very fine tubular pores; 40 percent gravel, cobbles, and stones; neutral; abrupt irregular boundary.

C1—38 to 60 inches; light brown (7.5YR 6/4) very stony clay, strong brown (7.5YR 5/6) moist; massive; very hard dry, firm moist, sticky and very plastic wet; 90 percent gravel, cobbles, and stones; neutral; slightly calcareous.

Rock fragments are igneous pebbles, cobbles, and stones, with stones becoming more prominent with depth. The A horizon has hue of 10YR or 7.5YR, value of 3 through 5 dry, and 2 or 3 moist. It is silt loam or silty clay loam that is 15 to 75 percent rock fragments. The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4. It is clay, silty clay, or silty clay loam that is 35 to 80 percent rock fragments. The C horizon has hue of 7.5YR or 10YR. It is 75 to 95 percent rock fragments.

DT—Des Moines association, steep. This mapping unit is on mountainsides at elevations of 7,500 to 9,000 feet. It is about 75 percent a Des Moines stony silt loam that has slopes of 15 to 45 percent.

About 15 percent of this mapping unit is included areas of Rubble land and 10 percent is included areas of Rock outcrop and Raton, Dalcan, and Oro Grande soils. Rubble land is at the base of long, steep slopes and Rock outcrop. Rock outcrop occurs as vertical escarpments and ridges at the upper limits of the association. The Raton and Dalcan soils are on ridgetops, and the Oro Grande soil is on lower ridges.

Des Moines stony silt loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Capability subclass VIIs dryland; Mountain Stony Loam range site.

Dioxice Series

The Dioxice series consists of deep, well drained soils on upland plains. These soils formed in mixed eolian deposits. Slopes are 1 to 5 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, sand dropseed, three-awn, and annuals. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is yellowish brown, brown, and very pale brown loam and clay loam about 26 inches thick. The substratum is pink and brown loam and clay loam with high lime content. Soil reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline in the substratum.

The soil is moderately slowly permeable. Available water capacity is 7 to 11 inches. Effective rooting depth is 60 inches or more.

Dioxice soils are used for range, dryland crops, wildlife habitat, and watershed.

Representative profile of Dioxice fine sandy loam, 1 to 5 percent slopes, 1,517 feet north and 20 feet east of the southwest corner of sec. 14, T. 24 N., R. 25 E.

A11—0 to 4 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft dry, very friable moist; many very fine and fine roots; many very fine interstitial pores; slightly calcareous; mildly alkaline; clear smooth boundary.

A12—4 to 8 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft dry, very friable moist, slightly

sticky and slightly plastic wet; many very fine and fine roots; few very fine and many interstitial pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B21—8 to 13 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine roots; many very fine tubular pores; slightly calcareous; mildly alkaline; clear wavy boundary.

B22—13 to 18 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; hard dry, friable moist, slightly sticky and plastic wet; common very fine and fine roots; few very fine tubular pores; common worm casts; slightly calcareous; common fine and very fine masses and mycelia of lime; mildly alkaline; clear smooth boundary.

B3ca—18 to 34 inches; very pale brown (10YR 7/4) clay loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common very fine and fine roots; common very fine tubular pores; strongly calcareous; many medium and large masses of lime; mildly alkaline; gradual wavy boundary.

C1ca—34 to 50 inches; pink (7.5YR 8/4) loam, light brown (7.5YR 6/4) moist; massive; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many very fine vesicular pores; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2ca—50 to 60 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; massive; hard dry, firm moist, sticky and plastic wet; few very fine tubular pores; few fine and medium masses of lime; slightly calcareous; moderately alkaline.

The A1 horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry and 2 or 3 moist, and chroma of 2 or 3. It is fine sandy loam, loam, or clay loam. The B2 horizon has hue of 10YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 2 through 4. It is loam, clay loam, or sandy clay loam. The Cca horizon has hue of 10YR or 7.5YR, value of 5 through 8 dry and 4 through 7 moist, and chroma of 2 through 4. It is loam, clay loam, or sandy clay loam.

DxC—Dioxice fine sandy loam, 1 to 5 percent slopes. This nearly level to gently sloping soil is on upland plains at elevations of 6,000 to 6,500 feet.

About 10 percent of this mapping unit is included areas of Dioxice soils of other textural phases, and about 10 percent is included areas of Texline, Gruver, Dallam, and Manzano soils. Texline soils are on ridges. Gruver and Dallam soils are in depressions and along the edges of delineations. The Manzano soil is in swales.

Dioxice fine sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is moderate, and the hazard of soil blowing is high.

This soil is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IVe–1 (HP) dryland; Sandy range site.

DxC2—Dioxice fine sandy loam, 1 to 5 percent slopes, eroded. This nearly level to gently sloping soil is in formerly cultivated fields on uplands.

About 15 percent of this mapping unit is included areas of Dioxice loam and Texline, Gruver, Dallam, and Manzano soils. Dioxice loam is throughout the map unit. Texline soils are on ridges. Gruver and Dallam soils are in depressions and along the edges of delineations. Manzano soils are in swales. These soils may be buried by wind deposited sandy loam or loamy sand.

Dioxice fine sandy loam, eroded, has a profile similar to the one described as representative of the series, but it has a sandy clay loam subsoil. All or most of the surface layer and commonly some material from the subsoil have been altered by soil blowing. Runoff is slow. The hazard of water erosion is moderate, and the hazard of soil blowing is high.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Sandy range site.

Etoe Series

The Etoe series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from sandstone and shale. Slopes are 35 to 60 percent. Elevation is 9,000 to 11,000 feet. The vegetation is Douglas-fir, white fir, quaking aspen, and mountain grasses. Precipitation is 22 to 27 inches, the mean annual soil temperature is 40° to 46° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is light brownish gray and pale brown loam about 11 inches thick. It is covered with about 2 inches of decaying forest litter. The subsurface layer is pale brown cobbly loam about 8 inches thick. The next layer is cobbly fine sandy loam about 17 inches thick. The subsoil is a strong brown very cobbly sandy clay loam. Soil reaction is slightly acid in the surface layer and subsurface layer and neutral in the subsoil.

The soil is moderately permeable. Available water capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more.

Etoe soils are used for woodland, wildlife habitat, recreation, and watershed.

Representative profile of Etoe loam in an area of Etoe-Etown association, steep, about 12 miles south of Eagle Nest, New Mexico, or 1 mile north-northwest of the point where U.S. Highway 64 leaves the Moreno Valley:

O1&O2—2 inches to 0; undecomposed and decomposed forest litter.

A21—0 to 3 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak very fine granular structure; soft dry, friable moist, slightly plastic wet; many fine roots; many fine interstitial

pores; about 5 percent rock fragments; slightly acid; clear smooth boundary.

A22—3 to 11 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft dry, friable moist, slightly plastic wet; many fine, few coarse and medium roots; many fine interstitial and common fine tubular pores; less than 10 percent rock fragments; slightly acid; gradual wavy boundary.

A&B—11 to 19 inches; pale brown (10YR 6/3) cobbly loam, dark yellowish brown (10YR 4/4) moist, and B2t material strong brown (7.5YR 5/6) cobbly fine sandy loam, dry and moist; weak medium subangular blocky structure; slightly hard dry, very friable moist; many fine, few medium and coarse roots; many fine tubular pores; 25 percent rock fragments; slightly acid; gradual wavy boundary.

B&A—19 to 36 inches; B material strong brown (7.5YR 5/6) dry and moist, cobbly fine sandy loam and A material pale brown (10YR 6/3) cobbly loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard dry, very friable moist; few coarse and medium roots; many fine tubular pores; 40 percent rock fragments; slightly acid; clear wavy boundary.

B21t—36 to 52 inches; strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4) very cobbly sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure parting to moderate fine granular; hard dry, firm moist, slightly sticky and slightly plastic wet; common fine roots; many fine interstitial and common fine tubular pores; thick patchy clay films on peds; 60 percent rock fragments; neutral; clear wavy boundary.

B22t—52 to 73 inches; strong brown (7.5YR 5/6) and dark brown (7.5 4/4) very cobbly sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; hard dry, firm moist, slightly sticky and slightly plastic wet; very few fine roots; many fine interstitial pores; thick patchy clay films on peds; 70 percent rock fragments; neutral.

Rock fragments are angular sandstone and shale and range in size from gravel to stones. The A21 and A22 horizons have hue of 7.5YR or 10YR, value of 6 or 7 dry and 3 or 4 moist, and chroma of 2 or 3 dry and moist. They are loam or fine sandy loam that is 0 to 10 percent rock fragments. The A&B and B&A horizons have hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 through 6. They are loam or fine sandy loam that is 20 to 60 percent rock fragments. The B21t and B22t horizons have hue of 5YR or 7.5YR, value of 3 through 5, and chroma of 2 through 6. They are sandy clay loam, loam, or heavy sandy loam that is 50 to 85 percent rock fragments.

EE—Etoe-Etown association, steep. The steep to very steep soils in this mapping unit are on mountainsides at elevations of 9,000 to 11,000 feet. It is about 60 percent an Etoe loam that has slopes of 35 to 60 percent and about 30 percent an Etown gravelly loam that has slopes of 35 to 60 percent. The Etoe soil is located on convex slopes, and the Etown soil is located on concave slopes.

About 10 percent of this mapping unit is included areas of Rock outcrop, Cypher, Moreno, and Angostura soils, and Cumulic Haplaquolls. Rock outcrop is on ridge crests. The Cypher and Moreno soils are along the lower edge of the mapping unit. The Angostura soils are along the upper edge of the mapping unit. Cumulic Haplaquolls are in small wet valleys.

Etoe loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Etown gravelly loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for woodland, wildlife habitat, recreation, and watershed. Capability subclass VIIs; woodland suitability group 5r1.

Etown Series

The Etown series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from sandstone and shale. Slopes are 35 to 60 percent. Elevation is 9,000 to 11,000 feet. The vegetation is Douglas-fir, white fir, quaking aspen, and mountain grasses. Precipitation is 22 to 27 inches, the mean annual soil temperature is 40° to 46° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown gravelly loam about 4 inches thick. It is covered with 2 inches of decaying forest litter. The subsurface layer is pinkish gray very gravelly loam about 14 inches thick. The subsoil extends to a depth of 60 inches. It is brown and light brownish gray gravelly clay loam, gravelly clay, and cobbly clay. Soil reaction is slightly acid throughout the profile.

The soil is moderately slowly permeable. Available water capacity is 2 to 6 inches. Effective rooting depth is 60 inches or more.

Etown soils are used for woodland, wildlife habitat, recreation, and watershed. These soils are mapped only with Etoe soils.

Representative profile of Etown gravelly loam in an area of Etoe-Etown association, steep, about 10 miles south-southwest of Eagle Nest, New Mexico, 1.5 miles north of the junction of U.S. Highway 64 and the Colfax-Taos County line:

O1—2 inches to 0; forest litter in various stages of decomposition.

A1—0 to 4 inches; brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft dry, friable moist, slightly plastic wet;

many fine and very fine roots; common fine interstitial pores; 25 percent angular gravel, 10 percent angular cobbles; slightly acid; gradual wavy boundary.

A2—4 to 18 inches; pinkish gray (7.5YR 6/2) very gravelly loam, brown (7.5YR 4/2) moist; weak fine medium and coarse granular structure; soft dry, friable moist, slightly plastic wet; many fine and medium roots; many fine interstitial pores; common fine and medium tubular pores; 50 percent angular gravel, 5 percent angular cobbles; slightly acid; clear wavy boundary.

B&A—18 to 30 inches; brown (7.5YR 5/2) very gravelly clay loam, dark brown (7.5 4/2) moist; about 20 percent pinkish gray (7.5YR 6/2) A2 material as coatings on soil peds and rock fragments; moderate medium subangular blocky structure; very hard dry, firm moist, plastic wet; common fine and medium roots; few fine tubular pores; many thin to thick clay films on rock fragments; 30 percent gravel, 20 percent cobbles, and 10 percent stones; slightly acid; gradual wavy boundary.

B21t—30 to 46 inches; brown (7.5YR 5/2) very cobbly clay, dark brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; very hard dry, firm moist, very plastic wet; common fine and few medium roots; few fine tubular pores; many thick clay films on rock fragments; many pressure faces; 25 percent gravel, 40 percent cobbles; slightly acid; clear wavy boundary.

B22t—46 to 60 inches; light brownish gray (10YR 6/2) very gravelly clay, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; very hard dry, firm moist, very plastic wet; few fine and medium roots; few fine tubular pores; common moderately thick clay films on rock fragments and peds; common pressure faces; 40 percent gravel, 15 percent cobbles, and 20 percent stones; slightly acid.

These soils are more than 60 inches deep. The A1 horizon has hue of 7.5YR or 10YR, value of 5 through 7 dry and 3 through 5 moist, and chroma of 2 or 3 dry and moist. It is fine sandy loam, silt loam, or loam that is 15 to 35 percent rock fragments. The A2 horizon has hue of 5YR or 7.5YR, value of 6 or 7 dry and 4 through 6 moist, and chroma of 2 or 3 dry and moist. It is loam or silt loam that is 30 to 80 percent rock fragments.

The depth to the B&A horizon is less than 24 inches. The B&A horizon has hue of 5YR or 7.5YR, value of 6 or 7 dry and 4 through 6 moist, and chroma of 2 or 3 dry and moist. It is clay loam, silty clay loam, or sandy clay loam that is 35 to 80 percent rock fragments. The B2t horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 7 dry and 3 through 6 moist, and chroma of 2 through 4 dry and moist. It is clay, sandy clay, silty clay, or clay loam that is 35 to 80 percent rock fragments.

Frolic Series

The Frolic series consists of deep, moderately well drained soils in swales and on fans. These soils formed in alluvium. Slopes are 1 to 5 percent. Elevation is 8,000 to 10,500 feet. The vegetation is sedges, iris, and grasses. Precipitation is 16 to 19 inches, the mean annual soil temperature is 42° to 47° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is dark grayish brown very fine sandy loam about 15 inches thick. The subsoil is dark grayish brown loam and sandy clay loam about 20 inches thick. The substratum is brown and grayish brown fine sandy loam and silt mottled with strong brown and pink. Soil reaction is mildly alkaline in the surface layer and subsoil and neutral in the substratum.

The soil is moderately permeable. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. The depth to the water table ranges from 3 to 5 feet.

Frolic soils are used for irrigated and dryland crops, range, wildlife habitat, recreation, and watershed.

Representative profile of Frolic very fine sandy loam in an area of Frolic association, gently sloping, about 3 miles south of Eagle Nest, New Mexico, or 500 feet up Sixmile Creek from its junction with U.S. Highway 64:

A11—0 to 6 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; slightly hard dry, very friable moist, slightly sticky and slightly plastic wet; many very fine, fine, and medium roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

A12—6 to 15 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to strong fine granular; slightly hard dry, very friable moist, slightly sticky and slightly plastic wet; many very fine, fine, and medium roots; many very fine interstitial pores; mildly alkaline; gradual wavy boundary.

B21—15 to 28 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard dry, very friable moist, slightly plastic wet; common very fine, fine, and medium roots; common fine tubular and many very fine interstitial pores; mildly alkaline; gradual wavy boundary.

B22—28 to 35 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine

subangular blocky structure; hard dry, friable moist, slightly sticky and plastic wet; few very fine, fine, and common medium roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

C1—35 to 42 inches; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct mottles of reddish yellow (7.5YR 6/6), strong brown (7.5YR 5/6) moist; massive; hard dry, very friable moist; few very fine roots; few very fine tubular pores; neutral; gradual wavy boundary.

C2—42 to 60 inches, grayish brown (10YR 5/2) silt, dark grayish brown (10YR 4/2) moist; common medium distinct mottles of strong brown (7.5YR 5/8) and many medium to large distinct mottles of pink (7.5YR 7/4); strong brown (7.5YR 5/6) moist; massive; hard dry, very friable moist; very few fine tubular pores; neutral.

The A1 horizon has value of 3 or 4 dry and 2 or 3 moist and chroma of 2 or 3. It is very fine sandy loam or loam. The B2 horizon has value of 3 or 4 dry and 2 or 3 moist and chroma of 2 or 3. It is loam or sandy clay loam, but thin discontinuous lenses of sand and gravel are common.

FC—Frolic association, gently sloping. This mapping unit is in swales in mountain valleys at elevations of 8,000 to 9,500 feet. It is about 65 percent a Frolic very fine sandy loam that has slopes of 1 to 5 percent and about 30 percent Cumulic Haplaquolls that have slopes of 1 to 5 percent. The Frolic soil is on the higher positions. The Cumulic Halaquolls are in the lower areas around drainageways.

About 5 percent of this mapping unit is included areas of Brycan, Saladon, Moreno, and Morval soils. The Brycan soil is in the well drained areas. The Saladon soils are in the low areas, and the Moreno and Morval soils are on the high points along the upper edge of the mapping unit.

Frolic very fine sandy loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are slight. Flooding is common. The Cumulic Haplaquolls are frequently flooded.

This mapping unit is used for summer range, irrigated and dryland crops, wildlife habitat, and watershed. Frolic very fine sandy loam in capability unit IVw–2 irrigated, unit IVw–1 dryland; Meadow range site. Cumulic Haplaquolls in capability subclass VIw dryland; Meadow range site.

Fuera Series

The Fuera series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from sandstone and shale. Slopes range from 25 to 60 percent. Elevation is 7,000 to 8,000 feet. The vegetation is Douglas-fir, white fir, and ponderosa pine and an understory of Gambel oak, mountain muhly, pine dropseed, and oatgrass. Precipitation is 22 to 27 inches, the mean annual soil temperature is 42° to 44° F, and the frost-free season is 90 to 100 days.

In a representative profile, the surface layer is dark grayish brown and pale brown cobbly loam about 10 inches thick. It is covered with about 1 inch of decomposing forest litter. The subsurface layer is very pale brown cobbly loam about 5 inches thick. The subsoil is brown cobbly clay and very cobbly clay about 31 inches thick. The substratum is a brown and yellowish brown very cobbly clay and very stony clay. Soil reaction is neutral in the surface layer, slightly acid and neutral in the subsoil, and neutral in the substratum.

The soil is slowly permeable. Available water capacity is 5 to 8 inches. Effective rooting depth is 60 inches or more.

Fuera soils are used for woodland, wildlife habitat, recreation, and watershed.

Representative profile of Fuera cobbly loam in an area of Fuera-Dargol-Vamer association, steep, approximately 8 miles northwest of Koehler or 3.5 miles south on Crow Creek Canyon Road from junction with New Mexico State Highway 555 and 1,490 feet west on logging road on north facing slopes:

O1&O2—1 inch to 0; decomposed and undecomposed forest litter.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and coarse roots; few fine tubular and many fine interstitial pores; 15 percent angular cobbles and gravel; neutral; abrupt smooth boundary.

A2—4 to 10 inches; pale brown (10YR 6/3) cobbly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and coarse roots; many fine tubular pores; 15 percent angular cobbles and gravel; neutral; clear smooth boundary.

A&B—10 to 15 inches; very pale brown (10YR 7/3) cobbly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic clay wet; lamellae of brown (10YR 5/3), dark brown (10YR 4/3) moist; strong fine subangular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; many thin clay films on peds; common medium and coarse and few fine roots; few very fine tubular pores; 20 percent angular cobbles and gravel; slightly acid; abrupt smooth boundary.

B21t—15 to 31 inches; brown (10YR 5/3) cobbly clay, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; very hard dry, very firm moist, sticky and plastic wet; common medium and coarse roots; few fine tubular pores;

many thick clay films on peds; 20 percent angular cobbles and gravel; slightly acid; clear smooth boundary.

B22t—31 to 46 inches; brown (10YR 5/3) very cobbly clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard dry, very firm moist, sticky and plastic wet; common fine and medium roots; few fine tubular pores; many thick clay films on peds; scattered small pockets and discontinuous thin lenses of very dark brown (10YR 2/2) moist carbonaceous material; 50 percent angular gravel, cobbles, and stones; neutral; gradual wavy boundary.

C1—46 to 58 inches; brown (10YR 5/3) very cobbly clay, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; very hard dry, very firm moist, sticky and plastic wet; few fine and medium roots; few fine tubular pores; scattered small pockets and discontinuous lenses of olive gray (5Y 4/2) weathered shale, dark grayish brown (2.5Y 4/2) moist; 50 percent angular cobbles and stones; neutral; gradual wavy boundary.

C2—58 to 64 inches; yellowish brown (10YR 5/4) dry and moist, very stony clay; common medium distinct mottles of yellowish brown (10YR 5/6) dry and moist; massive; very hard dry, very firm moist, sticky and plastic wet; few fine roots; few very fine tubular pores; 60 percent shale and sandstone fragments; neutral.

Rock fragments are angular sandstone and shale and range in size from gravel to stone. The A2 horizon has dry value of 4 through 7, moist value of 3 through 5, and chroma of 2 through 4. It is 15 to 35 percent rock fragments. The B horizon has hue of 7.5YR, 10YR, or 2.5Y, dry value of 5 or 6, moist value of 4 or 5, and chroma of 3 through 5 dry and moist. The upper part of the B horizon is 5 to 30 percent rock fragments, and the lower part is 25 to 70 percent. The C horizon has hue of 10YR or 2.5YR. It is 40 to 90 percent rock fragments.

FD—Fuera-Burnac association, steep. This mapping unit is on mountainsides at elevations of 7,500 to 9,000 feet. It is about 50 percent a Fuera cobbly loam that has slopes of 25 to 60 percent and about 35 percent a Burnac stony loam that has slopes of 10 to 25 percent. The Fuera soil is on mountainsides at all aspects. The Burnac soil is on benches and ridge crests.

About 15 percent of this mapping unit is included areas of Rock outcrop, Rubble land, Aridic Argiustolls, and Raton and Brycan soils. Rock outcrop is near vertical escarpments, generally at the highest part of the mapping unit. Rubble land is at the base of steep slopes or escarpments. The Raton soil is at the highest part of the unit. Aridic Argiustolls occur throughout. The Brycan soil is in the narrow, concave drainages.

Fuera cobbly loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Burnac stony loam has a profile similar to the one described as representative of the series, but it has a thicker, darker surface layer. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for woodland, recreation, wildlife habitat, and watershed. Fuera soil in capability subclass VIIe dryland, woodland suitability group 5r1. Burnac soil in capability subclass VIIs dryland, woodland suitability group 6o2.

FE—Fuera-Dargol-Vamer association, steep. This mapping unit is on mountainsides at elevations of 7,000 to 9,000 feet. It is about 35 percent a Fuera cobbly loam that has slopes of 40 to 60 percent; 30 percent a Dargol stony loam that has slopes of 10 to 30 percent; and 20 percent a Vamer stony loam that has slopes of 3 to 15 percent. The Fuera soil is mainly on north-facing mountainsides. The Dargol soil is mainly on south-facing slopes. The Vamer soil is on ridges and all aspects of the mountainsides.

About 15 percent of this mapping unit is included areas of Rombo, Midnight, and Ponil soils, and Rock outcrop. The Rombo and Midnight soils are on south-facing mountainsides. Ponil soils and Rock outcrop occur throughout the mapping unit.

Fuera cobbly loam has the profile described as representative of the series. Runoff is rapid. Water erosion is a high hazard. The hazard of soil blowing is slight.

Dargol stony loam has a profile similar to the profile described under the Dargol series, but it has a brown surface layer about 6 inches thick and has weathered shale at 25 to 30 inches. Runoff is medium or rapid. Water erosion is a moderate hazard. The hazard of soil blowing is slight.

Vamer stony loam has a profile similar to the profile described under the Vamer series, but it has a brown stony loam surface layer about 4 inches thick. Runoff is medium or rapid. Water erosion is a moderate hazard. The hazard of soil blowing is slight.

These soils are used for woodland, range, wildlife habitat, watershed, and recreation. Fuera soil in capability subclass VIIe dryland, woodland suitability group 5r1. Dargol soil in capability subclass VIIs dryland, woodland suitability group 6o1. Vamer soil in capability subclass VIs dryland, Mountain Grassland range site.

Gruver Series

The Gruver series consists of deep, well drained soils on uplands. These soils formed in mixed eolian deposits. Slopes are 0 to 3 percent. Elevation is 6,000 to 6,500 feet. The vegetation is blue grama, sand dropseed, buffalograss, fringed sagewort, and broom snakeweed. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown loam about 5 inches thick. The subsoil extends to a depth of 68 inches. It is brown clay loam to a depth of about 25 inches and reddish yellow, pinkish white, and pink clay loam below. Soil reaction is neutral in the

surface layer and neutral to moderately alkaline in the subsoil.

The soil is moderately slowly permeable. Available water capacity is 7 to 11 inches. Effective rooting depth is more than 60 inches.

Gruver soils are used for dryland crops, range, wildlife habitat, and watershed.

Representative profile of Gruver loam, 0 to 3 percent slopes, 102 feet east and 225 feet south of the northeast corner sec. 9, T. 25 N., R. 26 E.

Ap—0 to 5 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak thick platy structure parting to moderate fine granular; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

B21t—5 to 9 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard dry, friable moist, slightly sticky and plastic wet; many fine roots; many fine interstitial pores; common thin clay films on peds; neutral; clear smooth boundary.

B22t—9 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; hard dry, friable moist, slightly sticky and plastic wet; many fine roots; many fine tubular pores; many moderately thick clay films on peds; neutral; clear wavy boundary.

B23t—15 to 25 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate coarse prismatic structure parting to strong medium and coarse angular blocky; very hard dry, firm moist, slightly sticky and very plastic wet; common fine roots; few fine tubular pores; many moderately thick clay films on faces of peds; moderately alkaline; clear smooth boundary.

B24t—25 to 35 inches; reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; moderate coarse prismatic structure parting to strong medium and coarse angular blocky; very hard dry, friable moist, slightly sticky and plastic wet; few very fine roots; few very fine tubular pores; many moderately thick clay films on peds; moderately alkaline; gradual smooth boundary.

B25tca—35 to 49 inches; pinkish white (7.5YR 8/2) clay loam, pink (7.5YR 7/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard dry, friable moist, sticky and plastic wet; few fine tubular pores; many moderately thick clay films on peds; strongly calcareous; many large soft masses of lime; moderately alkaline; clear smooth boundary.

B26tca—49 to 61 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; moderate medium subangular blocky structure; very hard dry, firm moist, slightly sticky and very plastic wet; few fine tubular pores; many moderately thick clay films on peds; strongly calcareous; common medium and large soft masses of lime; moderately alkaline; abrupt wavy boundary.

B27tca—61 to 68 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; moderate fine angular blocky structure; very hard dry, firm moist, sticky and plastic wet; few very fine tubular pores; many thin clay films on peds; strongly calcareous; common fine seams of lime; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 or 3. It is loam, sandy clay loam, or fine sandy loam. The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, dry and 3 through 5 moist, and chroma of 3 through 6. The B2tca horizon has value of 7 or 8 dry and 5 or 6 moist, and chroma of 2 through 4. It is clay loam or sandy clay loam. The depth to the B2tca horizon ranges from 34 to 60 inches.

GaB—Gruver fine sandy loam, 0 to 3 percent slopes. This level to nearly level soil is on upland plains at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Gruver loam and Dallam and Dioxice soils. Gruver loam and Dallam soils are along the edges of delineations. Dioxice soils are on small knolls. Small intermittent lakes are scattered throughout the mapping unit. Some areas of more sloping Gruver soils are also included.

Gruver fine sandy loam has a profile similar to the one described as representative of the series, but it has a fine sandy loam surface layer. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IIIe-3 dryland; Sandy range site.

GbB—Gruver loam, 0 to 3 percent slopes. This level to nearly level soil is on upland plains at elevations of 6,000 to 6,500 feet.

About 10 percent of this mapping unit is included areas of Dallam and Dioxice soils. Dallam soils are along the edges of delineations. Dioxice soils are on small knolls. Small intermittent lakes are scattered throughout the mapping unit.

Gruver loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

This soil is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IIIe-1 dryland; Loamy range site.

GcB2—Gruver clay loam, 0 to 3 percent slopes, eroded. This level to nearly level soil is on plains in old cultivated fields on uplands. Blowouts and areas of deposition are common.

About 10 percent of this mapping unit is included areas of Gruver loam and Dallam and Dioxice soils.

Gruver loam occurs throughout the mapping unit in small, uneroded areas. Dallam soils are along the edges of delineations. Dioxice soils are on small knolls. Some areas of the more sloping Gruver soils are also included.

Gruver clay loam, eroded, has a profile similar to the one described as representative of the series, but it has a clay loam surface layer. All or part of the surface layer and commonly part of the subsoil have been lost by soil blowing. Runoff is medium. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, wildlife habitat, and watershed. Scattered areas are used for dryland crops. Capability subclass VIe dryland; Clayey range site.

Hillery Series

The Hillery series consists of deep, well drained soils on basalt flows. These soils formed in fine textured residuum derived from basalt and similar material. Slopes are 1 to 15 percent. Elevation is 8,200 to 11,000 feet. The vegetation is Arizona fescue, mountain muhly, pine dropseed, and prairie junegrass. Precipitation is 18 to 23 inches, the mean annual soil temperature is 40° to 44° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is very dark grayish brown stony loam and loam about 18 inches thick. The subsoil is reddish brown clay about 36 inches thick. The substratum is brown cobbly clay. Soil reaction is neutral throughout the profile.

The soil is very slowly permeable. Available water capacity is 7 to 10 inches. Effective rooting depth is 40 to 60 inches or more.

Hillery soils are used for summer range, recreation, wildlife habitat, and watershed.

Representative profile of Hillery stony loam, 1 to 7 percent slopes, approximately 7 miles east of Black Lake or 1,990 feet west and 1,345 feet south of the northeast corner sec. 21, T. 24 N., R. 17 E.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) stony loam, very dark brown (10YR 2/2) moist; weak thin platy structure; soft dry, very friable moist, slightly plastic wet; many fine and very fine roots; few very fine and fine tubular pores; 15 percent basalt stones; neutral; clear smooth boundary.

A12—3 to 18 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; slightly hard dry, very friable moist, slightly plastic wet; many fine and very fine roots; few fine tubular pores; about 5 percent basalt stones; neutral; abrupt smooth boundary.

B21t—18 to 49 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate coarse subangular and angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few very fine roots; few very fine tubular pores; common, moderately thick clay films on peds; common pressure faces; 10 percent basalt gravel and cobbles; neutral; gradual wavy boundary.

B22t—49 to 54 inches; reddish brown (2.5YR 4/4) clay, reddish brown (2.5YR 4/4) moist; moderate coarse subangular and angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; common, moderately thick clay films on peds; common pressure faces; 10 percent basalt gravel and cobbles; neutral; gradual wavy boundary.

C—54 to 60 inches; brown (7.5YR 4/2) cobbly clay, brown (7.5YR 4/2) moist; massive; very hard dry, very firm moist, slightly sticky and very plastic wet; 15 percent gravel and cobbles; neutral.

Rock fragments are basalt and range in size from pebbles to boulders. The A11 and A12 horizons have value of 3 through 5 dry and 2 or 3 moist and chroma of 1 through 3 dry and moist. They are loam or silt loam that is 5 to 50 percent rock fragments. The B21t and B22t horizons have hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry and moist. They are 5 to 30 percent rock fragments. The C horizon has hue of 7.5YR or 5YR, value of 4 or 5 dry and moist, and chroma of 2 through 6 dry and moist. It is 15 to 20 percent rock fragments. The depth to bedrock ranges from 40 to over 60 inches.

HrD—Hillery stony loam, 1 to 7 percent slopes. This nearly level to moderately sloping soil is on basalt mesas and basalt flows at elevations of 8,700 to 10,000 feet.

About 15 percent of this mapping unit is included areas of Rock outcrop and Saladon and Burnac soils. Rock outcrop occurs throughout the mapping unit. The Saladon soils are in swales. The Burnac soils are on small knolls.

Hillery stony loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are slight.

This soil is used for summer range, wildlife habitat, recreation, and watershed. Capability subclass VIIs dryland; Mountain Grassland range site.

La Brier Series

The La Brier series consists of deep, well drained soils on fans, flats, and uplands and in depressions and concave swales. These soils formed in fine textured alluvium derived from sandstone, shale, and basalt. Slopes range from 0 to 5 percent. Elevation is 5,900 to 7,600 feet. The vegetation on the nonsaline soils is blue grama, western wheatgrass, fringed sagewort, buffalograss, and three-awn. On the saline soil, it is alkali sacaton and inland saltgrass. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown silt loam and silty clay loam about 10 inches thick. The subsoil is dark grayish brown clay and pale brown silty clay loam about 32 inches thick. The substratum is light yellowish brown silty clay loam. The soil is mildly alkaline in the surface layer and moderately alkaline in the subsoil and substratum.

The soil is very slowly permeable. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more.

These soils are used for irrigated and dryland crops, range, wildlife habitat, recreation, and watershed.

Representative profile of La Brier silt loam 1,150 feet north and 2,210 feet west of the southeast corner sec. 36, T. 25 N., R. 24 E.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to moderate fine granular; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and very fine roots; many fine and very fine tubular pores; mildly alkaline; clear smooth boundary.

A12—4 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure parting to strong fine granular; slightly hard dry, friable moist, sticky and slightly plastic wet; common fine and very fine roots; many fine and very fine tubular pores; mildly alkaline; clear smooth boundary.

B21t—10 to 18 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; hard dry, firm moist, sticky and very plastic wet; common fine and very fine roots; few very fine tubular pores; many thin clay films on peds; moderately alkaline; clear smooth boundary.

B22t—18 to 29 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium and coarse angular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; few fine and very fine tubular pores; many thick clay films on peds; slightly calcareous; moderately alkaline; clear smooth boundary.

B3tca—29 to 42 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure; hard dry, firm moist, sticky and plastic wet; very few very fine roots; few very fine tubular pores; few thin clay films on peds; strongly calcareous; common fine threads and few fine soft masses of lime; moderately alkaline; gradual smooth boundary.

Cca—42 to 62 inches; light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard dry, friable moist, sticky and plastic wet; very few very fine roots; common very fine tubular pores; strongly calcareous; common fine threads and fine soft masses; moderately alkaline.

The A horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3. It is silt loam, silty clay loam, clay loam, or loam. The B2t horizon has value of 4 or 5 dry and 2 or 3 moist, and chroma of 2 through 4. It is clay, silty clay, clay loam, or silty clay loam. When dry, these soils have cracks that are ½ inch wide in the B2t horizon and extend upward to the surface. The C horizon has value of 4 through 6 dry and 3 through 5 moist.

Lb—La Brier silt loam. This level to nearly level soil is on fans and in swales and depressions at elevations of 6,000 to 7,500 feet. Slopes are 0 to 2 percent.

About 15 percent of this mapping unit is included areas of Litle, Vermejo, Manzano, and Swastika soils. Litle and Vermejo soils are on uplands and alluvial fans. Manzano soils are on flood plans. Swastika soils are in slightly elevated areas.

La Brier silt loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

This soil is used for range, irrigated and dryland crops, wildlife habitat, and watershed. Capability unit IIs–1 irrigated, IIIe–2 dryland; Loamy range site.

Lc—La Brier silty clay loam, saline. This level soil is in swales and on flats at elevations of 5,900 to 7,000 feet. Slopes are 0 to 1 percent. This soil is moderately saline.

About 10 percent of this mapping unit is included areas of Vermejo soils and Swastika saline soils and nonsaline La Brier and Swastika soils. The Vermejo soils occur throughout the mapping unit. The Swastika saline soils are in slightly elevated areas. The La Brier and Swastika soils that are not saline are along the margins of mapped areas.

La Brier silty clay loam, saline, has a profile similar to the one described as representative of the series, but it has a saline silty clay loam surface layer. Salt or gypsum crystals are visible within 12 to 24 inches of the surface. In summer the water table is at a depth of about 5 feet. Available water capacity is 5 to 7 inches. Runoff is slow. Water erosion is a moderate hazard. The hazard of soil blowing is moderate. Some areas are flooded with runoff from adjacent soils. Dikes or diversions are needed.

This soil is used for irrigated cropland, range, wildlife habitat, and watershed. Capability unit IVs–9 irrigated, VIs dryland; Salt Flats range site.

Lr—La Brier-Rock outcrop complex. This mapping unit is on broad basalt flows. Slopes range from 1 to 9 percent. This unit is about 45 percent a La Brier silt loam that has slopes of 1 to 5 percent and about 40 percent Rock outcrop. The La Brier soil is in small, smooth valleys between the Rock outcrop. The Rock outcrop is basalt. It occurs as ridges and squeeze-ups.

About 15 percent of this complex is included areas of Apache, Ayon, Thunderbird, and Torreon soils. Apache and Ayon soils are within and around the squeeze-ups. The Thunderbird and Torreon soils are near La Brier soils.

La Brier silt loam has a profile similar to the one described as representative of the series, but it has basalt gravel and cobbles in the substratum. Runoff is medium. Water erosion is a moderate hazard. The hazard of soil blowing is slight.

This unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland. La Brier soil in Loamy range site.

Laporte Series

The Laporte series consists of shallow, well drained soils on hills. These soils formed in residuum derived from limestone. Slopes are 3 to 30 percent. Elevation is 6,500 to 8,000 feet. The vegetation is pinyon pine, one-seed juniper, and Gambel oak and an understory of blue grama, sideoats grama, and little bluestem. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 120 to 150 days.

In a representative profile, the surface layer is grayish brown channery loam about 8 inches thick. Below this is grayish brown channery loam about 7 inches thick. The depth to limestone is 15 inches. Soil reaction is moderately alkaline throughout the profile.

The soil is moderately permeable. Available water capacity is 1 to 3 inches. Effective rooting depth is 10 to 20 inches.

Laporte soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Laporte channery loam in an area of Deacon-Oro Grande-Laporte complex, 3 to 15 percent slopes, 925 feet north and 900 feet west of the southeast corner sec. 5, T. 27 N., R. 25 E.

A1—0 to 8 inches; grayish brown (10YR 5/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft dry, very friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; 20 percent limestone fragments; strongly calcareous; moderately alkaline; clear smooth boundary.

Cca—8 to 15 inches; grayish brown (2.5Y 5/2) channery loam, dark grayish brown (10YR 4/2) moist; weak very fine granular structure; soft dry, very friable moist, slightly sticky and slightly plastic wet; many coarse and medium and common fine roots; many very fine interstitial pores; 20 percent limestone fragments; strongly calcareous; moderately alkaline; abrupt smooth boundary.

R—15 inches; limestone.

Rock fragments are limestone and range in size from channery to flaggy and stony. About 65 percent of the rock fragments are 0 to 6 inches long, about 25 percent are 6 to 15 inches long, and about 10 percent are over 15 inches long.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. The Cca horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 2 or 3. It is loam to silt loam or clay loam that is 10 to 30 percent rock fragments. The depth to limestone ranges from 10 to 20 inches.

LSF—Laporte channery loam, 5 to 35 percent slopes. This moderately sloping to steep soil is on hills and ridges at elevations of 6,500 to 7,500 feet.

About 10 percent of this mapping unit is included areas of Rock outcrop, and about 15 percent is included areas of Deacon, Penrose, and Ora Grande soils. The Rock outcrop is limestone and occurs throughout the mapping unit. The Deacon soil is on small fans. The Penrose soil is on positions similar to Laporte soil. The Oro Grande soil is along the sides of igneous dikes.

Laporte soil has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, watershed, and recreation. Capability subclass VIIs dryland; Hills range site.

Litle Series

The Litle series consists of moderately deep, well drained soils on uplands. These soils formed in fine textured residuum derived from shale. Slopes are 1 to 5 percent. Elevation is 5,800 to 7,400 feet. The vegetation is blue grama, western wheatgrass, galleta, alkali sacaton, and four-wing saltbush. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 55° F, and the frost-free season is 120 to 160 days.

In a representative profile, the surface layer is grayish brown clay loam about 4 inches thick. The subsoil is grayish brown clay about 13 inches thick. The substratum is grayish brown clay. The depth to shale is 23 inches. Soil reaction is moderately alkaline throughout the profile.

The soil is slowly permeable. Available water capacity is 3 or 4 inches. Effective rooting depth is 20 to 40 inches.

Litle soils are used for range, irrigated crops, wildlife habitat, and watershed.

Representative profile of Litle clay loam, 1 to 3 percent slopes, 1,880 feet east and 1,520 feet south of the northwest corner sec. 36, T. 31 N., R. 23 E.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure; hard dry, friable moist, sticky and plastic wet; many fine roots; many micro-interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B21—4 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard dry, firm moist, very sticky and very plastic wet; common fine roots; few fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B22—10 to 17 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard dry, firm moist, very sticky and very plastic wet; few fine roots; few very fine tubular pores; few pressure faces; strongly calcareous; moderately alkaline; clear smooth boundary.

C1—17 to 23 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2)

moist; weak thick platy structure; very hard dry, firm moist, sticky and plastic wet; few fine roots; very few very fine tubular pores; moderately alkaline; abrupt smooth boundary.

Cr—23 inches; grayish brown (2.5Y 5/2) shale, very dark grayish brown (2.5Y 3/2) moist; many mycelia of lime and gypsum between layers.

Rock fragments are limestone and shale channery and range from a trace to 15 percent of the surface layer. The A1 horizon has hue of 2.5Y or 10YR and chroma of 2 or 3. It is clay loam, silt loam, or silty clay loam. The B2 horizon has hue of 2.5Y or 10YR, value of 3 or 4 moist, and chroma of 2 through 4. It is clay, silty clay, or silty clay loam. Some pedons have salt accumulations in the upper part of the B horizon. The C1 horizon is clay, silty clay, or silty clay loam. The depth to shale is 20 to 40 inches.

LtB—Litle clay loam, 1 to 3 percent slopes. This nearly level soil is on uplands at elevations of 5,900 to 7,000 feet.

About 10 percent of this mapping unit is included areas of Mion and Vermejo soils. The Mion soil is on small elevated areas. The Vermejo soil is in low areas.

Litle clay loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This soil is used for irrigated crops, range, wildlife habitat, and watershed. Capability unit IVe–9 irrigated, subclass VIe dryland; Clayey range site.

Manzano Series

The Manzano series consists of deep, well drained soils on valley floors and alluvial fans and in swales. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. Elevation is 5,900 to 7,500 feet. The vegetation is blue grama, sand dropseed, western wheatgrass, vine-mesquite, and galleta. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is grayish brown loam about 6 inches thick. The subsoil is grayish brown clay loam about 35 inches thick. The substratum is grayish brown clay loam. Soil reaction is neutral in the surface layer and mildly alkaline in the subsoil or substratum.

The soil is moderately slowly permeable. Available water capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more.

Manzano soils are used for irrigated and dryland crops, range, wildlife habitat, recreation, and watershed.

Representative profile of Manzano loam in an area of Manzano association, gently sloping, about 20 miles southwest of Raton or 500 feet southeast of the center of the intersection of the Curtis Creek Bridge and U.S. Highway 64:

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many fine interstitial pores; neutral; clear wavy boundary.

B21—6 to 14 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; common fine tubular pores; mildly alkaline; clear wavy boundary.

B22—14 to 28 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard dry, friable moist, slightly sticky and plastic wet; common fine and very fine roots; common fine and very fine tubular pores; mildly alkaline; clear wavy boundary.

B23ca—28 to 41 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard dry, friable moist, sticky and plastic wet; very few fine and very fine roots; few very fine tubular pores; slightly calcareous; mildly alkaline; clear wavy boundary.

Cca—41 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (2:5Y 4/2) moist; massive; hard dry, firm moist, sticky and plastic wet; very few very fine roots; very few very fine tubular pores; slightly calcareous; few fine irregular soft masses and threads of lime; mildly alkaline.

These soils range from noncalcareous to slightly calcareous in the A and B horizons and from noncalcareous to strongly calcareous in the C horizon. Salt crystals are visible below a depth of 2 feet in some pedons.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. It is loam or fine sandy loam. The B horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3. It is silty clay loam, clay loam, silt loam, sandy clay loam, or loam. The C horizon has hue of 10 YR or 2.5Y, value of 5 or 6 dry and 3 through 5 moist, and chroma of 2 through 4. Some pedons have stratified sandy loam, silt loam, and silty clay loam.

Ma—Manzano loam. This level to nearly level soil is on flats and in swales at elevations of 5,900 to 7,000 feet. Slopes are 0 to 2 percent.

About 10 percent of this mapping unit is included areas of Seelez, dark and La Brier soils. Seelez, dark soils are throughout the unit. La Brier soils are in swales or depressions.

Manzano loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is slow. The hazards of water erosion and soil blowing are moderate. Areas subject to infrequent flooding need dikes and diversions for protection.

This soil is used for irrigated and dryland crops, range, wildlife habitat, and watershed. Capability unit IIe–5 irrigated, subclass IIIe–1 (HP) dryland; Loamy range site.

MB—Manzano association, gently sloping. This map-

ping unit is on valley fills and fans at elevations of 6,000 to 7,500 feet. It is about 65 percent a Manzano loam that has slopes of 0 to 3 percent and about 20 percent a Manzano fine sandy loam that has slopes of 1 to 3 percent. Manzano loam is on broad smooth flood plains. Manzano fine sandy loam is adjacent to intermittent streams and on the fans at the ends of these streams.

About 15 percent of this mapping unit is included areas of Seelez, dark soils; La Brier and Vermejo soils; Riverwash; and a soil similar to Manzano loam that has a gravelly substratum. The Seelez, dark soils and Riverwash are in delineations near the mountains. The soil similar to the Manzano soil is in delineations near the Chico Hills. La Brier soils occur in depressions throughout the unit. Vermejo soils are on the lower, smoother areas.

Manzano loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Manzano fine sandy loam has a profile similar to the one described as representative of the series, but it has a fine sandy loam surface layer. Runoff is very slow. The hazard of water erosion is moderate, and the hazard of soil blowing is high. Areas subject to infrequent flooding need dikes or diversions.

This mapping unit is used for range, wildlife habitat, and watershed. It has potential for irrigated crops if irrigation water is available. Manzano loam in capability unit IIIe–1 dryland; Loamy range site. Manzano fine sandy loam in capability unit IVe–1 (HP) dryland; Sandy range site.

Meloche Series

The Meloche series consists of deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium deposits derived from mixed rocks. Slopes are 15 to 55 percent. Elevation is 7,000 to 8,500 feet. The vegetation is pinyon pine, one-seed juniper, Gambel oak, mountainmahogany, and an understory of little bluestem, sideoats grama, and western wheatgrass. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 120 to 150 days.

In a representative profile, the surface layer is dark grayish brown stony silty clay loam about 9 inches thick. The subsoil is dark brown and brown clay about 23 inches thick. The substratum is pale brown silty clay. The depth to shale is 56 inches. The soil is mildly alkaline or moderately alkaline throughout.

The soil is very slowly permeable. Available water capacity is 7 to 9 inches. Effective rooting depth is 40 to 60 inches.

Meloche soils are used for range, wildlife habitat, recreation, and watershed. They are mapped only with Oro Grande soils.

Representative profile of Meloche stony silty clay loam in an area of Oro Grande-Meloche association, steep, 1,630 feet south and 900 feet east of the northwest corner sec. 31, T. 28 N., R. 26 E.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) stony silty clay loam, dark brown (10YR 3/3) moist; strong fine granular structure; very hard dry, very firm moist, slightly sticky and very plastic wet; many fine roots; many fine interstitial pores; 35 percent stones, cobbles, and gravel; mildly alkaline; clear smooth boundary.

B1—9 to 13 inches; dark brown (10YR 4/3) clay, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; common fine roots; few fine tubular pores; few pressure faces; slightly calcareous; moderately alkaline; clear smooth boundary.

B21—13 to 23 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; extremely hard dry, very firm moist, slightly sticky and very plastic wet; few fine roots; few fine tubular pores; many pressure faces; moderately calcareous; moderately alkaline; gradual smooth boundary.

B22ca—23 to 32 inches; brown (10YR 5/3) clay, yellowish brown (10YR 5/4) moist; moderate coarse subangular blocky structure; extremely hard dry, very firm moist, sticky and very plastic wet; few fine roots; few fine tubular pores; many pressure faces, few slickensides; strongly calcareous, few fine irregular filaments and masses of lime; moderately alkaline; gradual smooth boundary.

C1ca—32 to 56 inches; pale brown (10YR 6/3) silty clay, yellowish brown (10YR 5/4) moist; massive; very hard dry, very firm moist, sticky and very plastic wet; few fine roots; few fine tubular pores; many pressure faces; strongly calcareous; common medium and large lime masses and filaments of lime, lime coating on rock fragments; 5 percent cobbles; moderately alkaline; abrupt smooth boundary.

Cr—56 to 63 inches; white (10YR 8/2) shale, pale brown (10YR 6/3) moist.

Rock fragments are angular intrusive rock with small amounts of sandstone and range in size from pebbles to stones. The A horizon has value of 3 or 4 dry and 2 or 3 moist and chroma of 2 or 3 dry and moist. It is silty clay loam, clay loam, or loam that is 20 to 35 percent rock fragments. The B horizon has hue of 10YR to 7.5YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 2 through 4 dry and moist. It is clay, silty clay, or clay loam that is 0 to 25 percent rock fragments. The C horizon has hue of 10YR to 2.5Y. It is clay, silty clay, or clay loam that is 0 to 35 percent rock fragments.

Midnight Series

The Midnight series consists of very shallow to shallow, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from sandstone and shale. Slopes are 25 to 65 percent. Elevation is 7,000 to 9,000 feet. The vegetation is Gambel oak, mountainmahogany, pinyon pine, one-seed juniper, little

bluestem, and sideoats grama. Precipitation is 15 to 18 inches, the mean annual soil temperature is 45° to 47° F, and the frost-free season is 100 to 120 days.

In a representative profile, the surface layer is a grayish brown stony clay loam about 12 inches thick. The underlying material is a dark gray partially weathered shale with clay loam in the fractures. This grades to soft shale at a depth of about 27 inches. The soil is mildly alkaline throughout.

The soil is moderately permeable. Available water capacity is 1 or 2 inches. Effective rooting depth is 5 to 16 inches.

Midnight soils are used for wildlife habitat, recreation, watershed, and range.

Representative profile of Midnight stony clay in an area of Midnight-Rombo-Rock outcrop complex, approximately 7 miles north-northwest of Cimarron or 1,500 feet west-southwest along dirt road and 100 feet northwest upslope from the junction of North and Middle Ponil Creeks:

A11—0 to 7 inches; grayish brown (2.5Y 5/2) stony clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine granular structure with moderate thin and medium platy structure in the upper inch; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; few fine interstitial pores; 40 percent angular gravel, cobbles, and stones; mildly alkaline; abrupt smooth boundary.

A12—7 to 12 inches; grayish brown (2.5Y 5/2) stony clay loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine and few medium roots; few fine and medium tubular pores; 50 percent angular gravel, cobbles, and stones; mildly alkaline; abrupt smooth boundary.

C1r—12 to 27 inches; dark gray (5Y 4/1) partially weathered shale with clay loam in fractures, black (5Y 2/1) moist; few medium and coarse roots in fractures; gradual smooth boundary.

C2r—27 inches; dark gray (5Y 4/1) soft shale.

Angular sandstone and shale rock fragments make up 35 to 90 percent of the soil and range in size from gravel to stone. Soil reaction is neutral or mildly alkaline. The A11 and A12 horizons have hue of 2.5Y or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry and moist. They are clay loam or loam that is 35 to 70 percent rock fragments. The C1 horizon has hue of 2.5Y or 5Y, value of 3 or 4 dry and 2 or 3 moist, and chroma of 1 or 2 dry and moist. The depth to shale is 5 to 16 inches.

Mn—Midnight-Rombo-Rock outcrop complex. The steep to very steep soils of this mapping unit are on mountainsides at elevations of 7,000 to 9,000 feet. Slopes are 25 to 65 percent. This unit is about 35 percent a Midnight stony clay that has slopes of 25 to 50 percent, 30 percent a Rombo cobbly silty clay loam that has slopes of 25 to 50 percent, and about 20 percent Rock outcrop. Rock outcrop is on nearly vertical escarpments and on rims and ridges.

About 15 percent of this mapping unit is included areas of Ponil, Fuera, and Dargol soils, and Rubble land. The Ponil, Fuera, and Dargol soils are on smoother positions. Rubble land is below Rock outcrop.

Midnight stony clay loam has the profile described as representative of the series. Runoff is very rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Rombo cobbly silty clay loam has the profile described as representative of the series. Runoff is very rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Rock outcrop is sandstone and shale.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Capability subclass VIIs; Mountain Shale range site.

Mion Series

The Mion series consists of shallow, well drained soils on low hills, ridges, and mesatops. These soils formed in residuum derived from shale. Slopes are 1 to 25 percent. Elevation is 5,800 to 7,000 feet. The vegetation is sideoats grama, fringed sagewort, yucca, pinyon pine, and one-seed juniper. Precipitation is 14 to 17 inches, the mean annual soil temperature is 49° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is a light brownish gray silt loam about 4 inches thick. The next layer is a pale brown silty clay about 10 inches thick. The depth to shale is 14 inches. The soil is moderately alkaline.

The soil is very slowly permeable. Available water capacity is 2 or 3 inches. Effective rooting depth is 10 to 20 inches.

Mion soils are used for range, wildlife habitat, and watershed.

Representative profile of Mion silt loam in an area of Mion-Litle association, strongly sloping, about 10 miles west of Maxwell or 2,650 feet north and 400 feet west of the southeast corner sec. 33, T. 26 N., R. 21 E.

A1—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 4/3) moist; weak fine granular structure; slightly hard dry, friable moist, plastic wet; many fine roots; few fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

AC—4 to 14 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; many fine roots; common fine and medium tubular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C—14 to 22 inches; light brownish gray (2.5Y 6/2) shale, dark grayish brown (2.5Y 4/2) moist; many fine roots between plates in upper inch; thin deposits of lime between plates in upper few inches.

The A horizon has hue of 10YR to 2.5Y, value of 4 through 6 dry and 3 or 4 moist, and chroma of 2

through 4. It is silt loam or silty clay loam. The AC horizon has hue of 10YR through 5Y, value of 5 or 6 dry, 4 or 5 moist, and chroma of 2 through 4 dry and moist. It is silty clay or clay. The depth to shale is 10 to 20 inches.

MoB—Mion silty clay loam, 1 to 3 percent slopes. This nearly level soil is on uplands at elevations of 5,800 to 6,500 feet.

About 10 percent of this mapping unit is included areas of Litle and Vermejo soils and shale Rock outcrop. The Litle and Vermejo soils are in low areas. The shale Rock outcrop is on high areas or short sloping areas.

Mion silty clay loam has a profile similar to the one described as representative of the series, but it has a silty clay loam surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Shallow range site.

Mp—Mion-Rock outcrop complex. This mapping unit is on hills at elevations of 5,800 to 7,000 feet. Slopes are 10 to 75 percent. This unit is 65 percent a Mion silty clay loam that has slopes of 10 to 25 percent and 25 percent Rock outcrop that has slopes greater than 25 percent. The Mion soil occurs throughout the mapping unit. Rock outcrop is on the crests of steep slopes and on very steep slopes (fig. 4).

About 10 percent of this mapping unit is included areas of Litle and Penrose soils. Litle soils are on the lower ends of fans. Penrose soils are narrow areas along the upper boundary of some delineations.

Mion silty clay loam has a profile similar to the one described as representative of the series, but it has a silty clay loam surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate. Rock outcrop is exposed limestone, sandstone, or shale.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIIe dryland; Mion soil in Shallow range site.

MR—Mion-Litle association, strongly sloping. These gently sloping to strongly sloping soils are on uplands, ridges, and breaks at elevations of 5,800 to 7,000 feet. This unit is about 50 percent a Mion silt loam that has slopes of 3 to 12 percent and 35 percent a Litle silt loam that has slopes of 1 to 5 percent. The Mion soils are mostly on the higher, steeper positions. The Litle soils are on the lower, smoother positions.

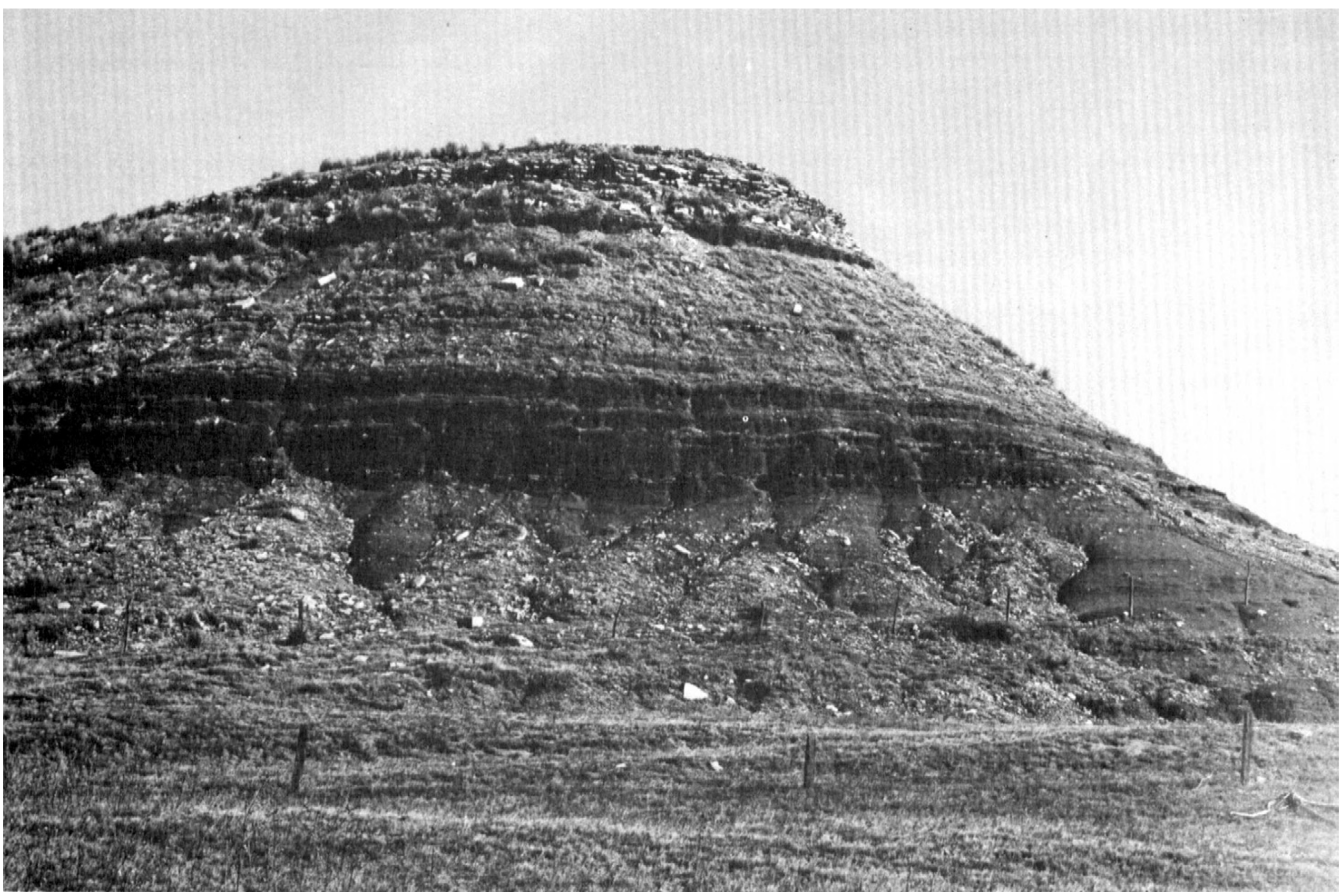


Figure 4.—Area of Mion-Rock outcrop complex. Vermejo soils are in the foreground.

About 15 percent of this mapping unit is included areas of Vermejo, Colmor, and Tinaja soils and shale Rock outcrop. The Vermejo and Colmor soils are on the lower, smoother positions. Tinaja soils are on convex ridges and knolls along low breaks into drainageways. Shale outcrop is on the steeper areas. Some moderately eroded and severely eroded areas are also included.

Mion silt loam has the profile described as representative of the series. Runoff is medium or rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Litle silt loam has a profile similar to the one described as representative of the series, but it has a silt loam surface layer. Runoff is medium to rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, and watershed. Small areas of the Litle soils are used for irrigated crops. Capability subclass VIe dryland. Mion soil in Shallow range site. Litle soil in Loamy range site.

Moreno Series

The Moreno series consists of deep, well drained soils on valley sides. These soils formed in fine textured colluvium, residuum, and alluvium derived from sandstone, shale, and intrusive rocks. Slopes are 3 to 30 percent. Elevation is 8,000 to 9,000 feet. The vegetation is Arizona fescue, Kentucky bluegrass, mountain muhly, and bottlebrush squirreltail. Precipitation is 16 to 18 inches, the mean annual soil temperature is about 44° to 47° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown loam and sandy clay loam about 8 inches thick. The subsoil is reddish brown clay loam and gravelly clay about 29 inches thick. The substratum is reddish brown gravelly clay. The soil is neutral throughout.

The soil is slowly permeable. Available water capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more.

Moreno soils are used for range, homesites, recreation, dryland crops, wildlife habitat, and watershed.

Representative profile of Moreno loam in an area of Morval-Moreno association, sloping, about 1¾ miles west of Eagle Nest, New Mexico, or 660 feet north and 260 feet west of Bill Gallagher Ranch headquarters:

A11—0 to 4 inches; brown (7.5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; moderate fine and very fine granular structure; soft dry, very friable moist, slightly sticky and plastic wet; many fine and very fine roots; many very fine interstitial pores; 5 percent rounded cobbles; neutral; clear smooth boundary.

A12—4 to 8 inches; brown (7.5YR 4/2) sandy clay loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; many very fine interstitial pores; 5 percent rock fragments; neutral; clear smooth boundary.

B21t—8 to 14 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard dry, firm moist, slightly sticky and very plastic wet; common fine and very fine roots; few fine tubular pores; common thin clay films on peds; 5 percent rock fragments; neutral; gradual smooth boundary.

B22t—14 to 25 inches; reddish brown (2.5YR 4/4) gravelly clay, dark reddish brown (2.5YR 3/4) moist; moderate fine angular and subangular blocky structure; hard dry, firm moist, slightly sticky and very plastic wet; common fine and very fine roots; few very fine tubular pores; many thick clay films on peds; 25 percent angular gravel; neutral; gradual smooth boundary.

B23t—25 to 37 inches; reddish brown (2.5Y 4/4) gravelly clay, dark reddish brown (2.5YR 3/4) moist; common medium mottles of light reddish brown (2.5YR 6/4), reddish brown (2.5YR 5/4) moist; moderate medium angular and subangular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few very fine roots; few very fine tubular pores; many thick clay films on peds; 30 percent angular gravel; neutral; gradual wavy boundary.

C—37 to 60 inches; reddish brown (2.5Y 5/4) gravelly clay, reddish brown (2.5YR 4/4) moist; many medium mottles of light reddish brown (2.5YR 6/4), reddish brown (2.5YR 5/4), and pink (5YR 8/3), pink (5YR 7/3) moist; massive; very hard dry, very firm moist, slightly sticky and very plastic wet; very few very fine roots; very few very fine tubular pores; 30 percent angular gravel; common, rounded soft masses of lime; neutral.

Rock fragments are sandstone, shale, and intrusive igneous pebbles, cobbles, and stones. The A1 horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist, and chroma of 2 or 3 dry or moist. It is loam or sandy clay loam that is about 5 to 10 percent rock fragments. The B21t horizon has hue of 7.5YR through 2.5YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 6 dry or moist. It is clay loam or clay that is about 5 to 30 percent rock fragments. The C horizon has hue of 2.5YR, 5YR, or 7.5YR and value of 4 or 5 dry. It is clay, clay loam, or sandy clay that is about 20 to 35 percent rock fragments.

MS—Moreno-Cypher association, hilly. This mapping unit is on mountain foot slopes at elevations of 8,000 to 9,000 feet. It is about 65 percent a Moreno loam that has slopes of 5 to 15 percent and about 20 percent a Cypher gravelly loam that has slopes of 10 to 25 percent. The Moreno soil is on the lower parts of fans and ridges. The Cypher soil is on ridgecrests.

About 15 percent of this mapping unit is included areas of Brycan and Morval soils, Rock outcrop, and Rubble land. The Brycan soils are in narrow concave drainageways. Morval soils are on fans and small valley

fills. Rock outcrop and Rubble land are on ridgecrests and very steep slopes.

Runoff is medium on both soils. Both soils have a moderate hazard of water erosion and a slight hazard of soil blowing.

This mapping unit is used for range, recreation, homesites, woodland, wildlife habitat, and watershed. Moreno soil in capability subclass VIe dryland, Mountain Grassland range site. Cypher soil in capability subclass VIIe dryland, woodland suitability group 6d2.

Morval Series

The Morval series consists of deep, well drained soils in wide mountain valleys. These soils formed in alluvium derived from shale, sandstone, and intrusive rocks. Slopes are 1 to 5 percent. Elevation is 8,000 to 9,000 feet. The vegetation is blue grama, mountain muhly, bottlebrush squirreltail, Kentucky bluegrass, and western wheatgrass. Precipitation is 16 to 18 inches, the mean annual soil temperature is 44° to 47° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown clay loam about 6 inches thick. The subsoil is brown clay loam and light brown silty clay loam about 23 inches thick. The substratum to a depth of 57 inches is pink silty clay loam high in lime. Below this is brown gravelly sandy clay loam. Soil reaction is mildly alkaline in the surface layer and upper part of the subsoil and moderately alkaline below.

The soil is moderately permeable. Available water capacity is 9 to 12 inches. Effective rooting depth is 60 inches or more.

Morval soils are used for irrigated and dryland crops, range, wildlife habitat, and watershed.

Representative profile of Morval clay loam in an area of Morval-Moreno association, sloping, in Eagle Nest 225 feet west and 175 feet north of the center of the junction of New Mexico State Highway 38 and U.S. Highway 64:

A1—0 to 6 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly plastic wet; many fine and very fine roots; many very fine interstitial pores; mildly alkaline; clear wavy boundary.

B1t—6 to 13 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to strong coarse subangular blocky; hard dry, friable moist, slightly plastic wet; many fine and very fine roots; many very fine tubular pores; few thin clay films on peds; mildly alkaline; clear wavy boundary.

B2t—13 to 21 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; strong coarse prismatic structure parting to moderate medium subangular and angular blocky; hard dry, friable moist, slightly sticky and plastic wet; common fine, very fine, and medium roots; many very fine tubular pores; many moderately thick clay films on peds; 5 percent gravel; moderately alkaline; gradual wavy boundary.

B3tca—21 to 29 inches; light brown (7.5YR 6/4) silty clay loam, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure; slightly hard dry, friable moist, slightly sticky and plastic wet; common fine and few medium roots; many very fine tubular pores; few thin clay films on peds; 5 percent gravel; strongly calcareous; few fine threads and masses of lime; moderately alkaline; gradual wavy boundary.

Cca—29 to 57 inches; pink (7.5YR 7/4) silty clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard dry, friable moist, slightly sticky and plastic wet; few fine roots; many very fine tubular pores; 5 percent gravel; strongly calcareous; moderately alkaline; abrupt wavy boundary.

IIB2t—57 to 60 inches; brown (7.5 5/4) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; massive; slightly hard dry, very friable moist, slightly sticky and plastic wet; many very fine interstitial pores; 50 percent gravel; many thin clay films on faces of peds and bridges between sand grains; strongly calcareous; moderately alkaline.

Rock fragments are sedimentary and intrusive and are pebbles or cobbles in size. They range from a trace to 10 percent of the A horizon and from 5 to 25 percent of the B and C horizons.

The A horizon has hue of 10YR to 7.5YR and chroma of 2 or 3. It is clay loam or loam. The B1t horizon has hue of 10YR to 7.5YR and chroma of 2 to 3. It is clay loam or loam. The B2t horizon has hue of 10YR to 7.5YR, value of 5 to 6 dry and 4 to 5 moist, and chroma of 3 to 4. It is clay loam or loam. The Cca horizon has hue of 10YR to 7.5YR and 2.5Y, value of 6 through 8 dry and 5 through 7 moist, and chroma of 2 through 4. It is silty clay loam to clay loam. The IIB2t horizon is below a depth of 46 inches.

MT—Morval-Moreno association, sloping. This mapping unit is in wide mountain valleys at elevations of 8,000 to 9,000 feet. It is about 55 percent a Morval clay loam that has slopes of 1 to 5 percent and 35 percent a Moreno loam that has slopes of 3 to 30 percent. The Morval soil is on the smoother and lower areas. The Moreno soil is on the higher areas.

About 10 percent of this mapping unit is included areas of Cypher, Brycan, and Frolic soils and Cumulic Haplaquolls. The Cypher soils are on the higher areas at the edges of the mapping unit. The Brycan and Frolic soils and Cumulic Haplaquolls are on the smoother positions adjacent to small drainageways.

Morval clay loam has medium runoff. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Moreno loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, irrigated and dryland crops, homesites, recreation, wildlife habitat,

and watershed. Morval soil in capability unit IVe-2 irrigated, IVe-1 (RM) dryland; Mountain Grassland range site. Moreno soil in capability subclass VIe dryland; Mountain Grassland range site.

Mughouse Series

The Mughouse series consists of moderately deep, well drained soils on hills and ridges. These soils formed in residuum and colluvium derived from sandstone and shale. Slopes range from 5 to 15 percent. Elevation is 6,400 to 7,500 feet. The vegetation is pinyon pine, one-seed juniper, Gambel oak, blue grama, little bluestem, and big bluestem. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown stony sandy clay loam about 4 inches thick. The subsoil is brown and light brownish gray cobbly and gravelly clay and cobbly sandy clay about 34 inches thick. Sandstone is at a depth of 38 inches. The soil is mildly alkaline throughout.

The soil is slowly permeable. Available water capacity is 3 to 5 inches. Effective rooting depth is 20 to 40 inches.

These soils are used for range, wildlife habitat, homesites, watershed, and recreation.

A representative profile of Mughouse stony sandy clay loam in an area of Mughouse-Swastika complex, about 3 miles west of Raton, or 1.6 miles west and 280 feet north of junction of New Mexico State Highway 555 and railroad tracks:

A1—0 to 4 inches; brown (10YR 5/3) stony sandy clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard dry, friable moist, sticky and plastic wet; many fine roots; many fine interstitial pores; 15 percent sandstone stones and cobbles; mildly alkaline; clear wavy boundary.

B21t—4 to 9 inches; brown (7.5YR 5/4) cobbly clay, dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure parting to strong fine angular blocky; very hard dry, firm moist, sticky and very plastic wet; many fine and common medium roots; few fine tubular pores; many moderately thick clay films on peds and rock fragments; 5 percent stones, 5 percent cobbles, and 5 percent gravel; mildly alkaline; clear wavy boundary.

B22t—9 to 26 inches; light brownish gray (2.5Y 6/2) gravelly clay, dark grayish brown (2.5Y 4/2) moist; strong medium subangular and angular blocky structure; very hard dry, firm moist, sticky and very plastic wet; common fine and few medium roots; few fine tubular pores; many moderately thick clay films on peds and rock fragments; 5 percent cobbles and 20 percent gravel; mildly alkaline; clear wavy boundary.

B3—26 to 38 inches; light brownish gray (2.5Y 6/2) cobbly sandy clay, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; very hard dry, firm moist, slightly sticky and very plastic wet; very few very fine roots; few fine tubular pores; few pressure faces; 20 percent cobbles, 5 percent stones, and 5 percent gravel; noncalcareous; few fine irregular filaments of lime on peds near the lower boundary of the horizon; mildly alkaline; abrupt smooth boundary.

R—38 inches; sandstone.

Rock fragments are angular sandstone. Stones cover 3 to 25 percent of the surface. Reaction is mildly alkaline or moderately alkaline throughout. The A1 horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist, and chroma of 2 or 3 dry and moist. It is loam, sandy loam, or sandy clay loam. It is 15 to 30 percent stones and cobbles. The B21t horizon has hue of 7.5YR, 10YR or 2.5Y, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 through 4 dry and moist. It is clay, silty clay, or sandy clay. It is 5 to 25 percent gravel, 5 to 15 percent cobbles, and 5 to 20 percent stones. The total content of rock fragments is 15 to 35 percent.

The B21t horizon is not present in all pedons. In some pedons gypsum or lime has accumulated on rock faces and between peds near the bedrock. Depth to bedrock is 20 to 40 inches.

Mu—Mughouse-Swastika complex. This mapping unit is on foothills at elevations of 6,400 to 7,500 feet. It is about 50 percent a Mughouse stony sandy clay loam that has slopes of 5 to 15 percent and about 35 percent a Swastika silt loam that has slopes of 3 to 5 percent. The Mughouse soil is on the sides of low ridges. The Swastika soil is on the tops of low ridges.

About 15 percent of this unit is included areas of Berthoud and Mion soils, a soil that is similar to the Mughouse soil but is stony throughout, and Rock outcrop. The Berthoud soil is in small valleys. The Mion soil is in short steep areas. The soil similar to Mughouse soil is in short steep areas of the Mughouse soil. Rock outcrop is sandstone or shale. It occurs throughout the unit.

Mughouse stony sandy clay loam has the profile described as representative of the series. Runoff is medium. Water erosion is a moderate hazard. The hazard of soil blowing is slight.

Swastika silt loam has a profile similar to the one described as representative of the series, but it is slightly finer textured in the subsoil. Runoff is medium. Water erosion is a moderate hazard. The hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, recreation, homesites, and watershed. Capability subclass VIe dryland. Mughouse soil in Hills range site, Swastika soil in Loamy range site.

Oro Grande Series

The Oro Grande series consists of shallow and very shallow, well drained soils on hills and mountainsides. They formed in residuum derived from intrusive rocks. Slopes are 3 to 50 percent. Elevation is 6,500 to 8,500 feet. The vegetation is blue grama, little bluestem, loco, pinyon pine, one-seed juniper, and Rocky Mountain juniper. Precipitation is 14 to 18 inches, the mean

annual soil temperature is 47° to 53° F, and the frost-free season is 120 to 150 days.

In a representative profile, the surface layer is dark grayish brown gravelly loam about 11 inches thick. The depth to intrusive bedrock is 11 inches. Soil reaction is neutral.

The soil is moderately permeable. Available water capacity is 1 to 2 inches. Effective rooting depth is 7 to 20 inches.

Oro Grande soils are used for range and watershed.

Representative profile of Oro Grande gravelly loam in an area of Oro Grande-Tafoya association, 760 feet west and 2,260 feet south of the northeast corner of sec. 32, T. 27 N., R. 26 E.

A11—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate coarse granular structure; soft dry, friable moist, slightly plastic wet; many fine and very fine roots; many fine interstitial pores; 35 percent gravel, cobbles, and stones; neutral; clear wavy boundary.

A12—6 to 11 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak coarse granular structure; slightly hard dry, friable moist; many fine and very fine roots; common fine interstitial pores; 70 percent gravel, cobbles, and stones; neutral; abrupt smooth boundary.

R—11 inches; intrusive rock weathered in upper few inches.

Rock fragments are intrusive pebbles, cobbles, and stones and are 35 to 70 percent of the profile. The profile has hue of 7.5YR or 10YR, value of 4 or 5 dry and 2 or 3 moist, and chroma of 2 or 3. It is gravelly loam, gravelly sandy loam, cobbly loam, or very stony loam. Rock fragments cover 10 to 40 percent of the surface. The depth to bedrock is 7 to 20 inches.

OG—Oro Grande-Meloche association, steep. This mapping unit is on mountainsides at elevations of 7,000 to 8,500 feet. It is about 40 percent an Oro Grande very stony loam that has slopes of 25 to 50 percent and 35 percent a Meloche stony silty clay loam that has slopes of 15 to 45 percent. The Oro Grande soil is on ridgetops. The Meloche soil is on side slopes on all exposures.

About 15 percent of this mapping unit is included areas of Rock outcrop, and about 10 percent is included areas of Deacon, Laporte, and Mion soil. The rock outcrop is on escarpments and dikes along the crests of ridges and on steep flows of about an acre or less in size. The Laporte soil is on low ridges. The Mion soil is on the sides of hills.

Oro Grande very stony loam has a profile similar to the one described as representative of the series, but it has a very stony surface layer. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Meloche stony silty clay loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Oro Grande soil in capability subclass VIIs dryland, Breaks range site. Meloche soil in capability subclass VIIe dryland, Breaks range site.

OT—Oro Grande-Tafoya association. This mapping unit is on hills at elevations of 6,500 to 7,700 feet. Slopes are 9 to 50 percent. This unit is about 55 percent an Oro Grande gravelly loam that has slopes of 9 to 50 percent and about 30 percent a Tafoya stony silt loam that has slopes of 9 to 45 percent. The Oro Grande soil is on the hilltops and low ridges. The Tafoya soil is on the hillsides.

About 15 percent of this mapping unit is included areas of Deacon, La Brier, and Manzano soils and Rock outcrop. The Deacon soil is on small alluvial fans. The La Brier and Manzano soils are on flood plains. Rock outcrop occurs throughout the mapping unit.

Oro Grande gravelly loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Tafoya stony silt loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Oro Grande soil in capability subclass VIIs dryland, Breaks range site. Tafoya soil in capability subclass VIIe dryland, Breaks range site.

Partri Series

The Partri series consists of deep, well drained soils on uplands. These soils formed in alluvium and eolian material derived from sandstone. Slopes are 0 to 3 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, sand dropseed, and broom snakeweed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is dark grayish brown and brown silty clay loam and silty clay about 26 inches thick. The substratum is brown clay loam. Soil reaction is slightly acid in the surface layer, slightly acid and neutral in the subsoil, and mildly alkaline in the substratum.

The soil is slowly permeable. Available water capacity is 9 to 10 inches. Effective rooting depth is 60 inches or more.

Partri soils are used for range, wildlife habitat, recreation, and watershed. They are mapped only with Carnero soils.

Representative profile of Partri silt loam in an area of Carnero-Partri association 850 feet south and 50 feet west of the northeast corner of sec. 9, T. 26 N., R. 27 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many fine interstitial and few fine tubular pores; slightly acid; clear smooth boundary.

B1t—3 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine sub-

angular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; many fine and very fine roots; many fine and few medium tubular pores; slightly acid; clear smooth boundary.

B21t—9 to 14 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to strong medium angular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and very fine roots; common fine tubular pores; common thin clay films on peds; slightly acid; clear smooth boundary.

B22t—14 to 29 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5YR 4/4) moist; strong medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and very fine roots; few fine tubular pores; many thick clay films on peds; neutral; gradual smooth boundary.

C1ca—29 to 43 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; few fine and very fine roots; few fine tubular pores; 10 percent gravel; slightly calcareous; 30 percent of surface area has fine irregular filaments of lime; mildly alkaline; gradual smooth boundary.

C2—43 to 60 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; massive; hard dry, firm moist, slightly sticky and plastic wet; very few very fine roots; common fine tubular pores; 10 percent gravel; slightly calcareous; mildly alkaline.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 dry, and chroma of 2 or 3 dry and moist. It is silt loam or loam. The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry and 3 or 4 moist. It is silty clay, clay, or silty clay loam. The C1ca horizon has hue of 7.5YR or 10YR and chroma of 3 or 4 dry and moist. The C2 horizon has hue of 10YR or 7.5YR. The C horizon is 0 to 20 percent rock fragments.

Penrose Series

The Penrose series consists of shallow, well drained soils on hills, ridges, and mesatops. These soils formed in residuum derived from limestone and interbedded limy earths. Slopes are 0 to 9 percent. Elevation is 5,800 to 7,500 feet. The vegetation is blue grama, sideoats grama, hairy grama, pinyon pine, and one-seed juniper. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the soil is a light brownish gray loam and silt loam about 11 inches thick. The depth to limestone is 11 inches. Soil reaction is moderately alkaline.

The soil is moderately permeable. Available water capacity is 1 or 2 inches. Effective rooting depth is from 10 to 20 inches.

Penrose soils are used for range, wildlife habitat, and watershed.

Representative profile of Penrose loam, 0 to 9 percent slopes, 1,320 feet west and 1,055 feet south of the northeast corner sec. 6, T. 24 N., R. 23 E.

A1—0 to 4 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak thick platy structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; many fine interstitial pores; moderately calcareous; moderately alkaline; clear smooth boundary.

C—4 to 11 inches; light brownish gray (10YR 6/2) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure parting to moderate very fine granular; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; abrupt smooth boundary.

R—11 inches; hard gray fractured limestone in upper few inches with lime accumulations in cracks.

Rock fragments are limestone channery and range from 0 to 15 percent of the profile. The A horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 2 or 3 dry or moist. It is loam to silt loam. The C horizon has value of 5 or 6 dry and chroma of 2 or 3 dry and moist. It is silt loam to loam. The depth to bedrock ranges from 10 to 20 inches.

PE—Penrose loam, 0 to 9 percent slopes. This soil is on uplands at elevations of 5,800 to 7,500 feet.

About 20 percent of this mapping unit is included areas of Laporte and Colmor soils and Rock outcrop. Laporte and Colmor soils are in low areas on fans that receive slight amounts of additional water. Rock outcrop occurs throughout the mapping unit.

Penrose loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIIs dryland; Shallow range site.

Plack Series

The Plack series consists of very shallow to shallow, well drained soils on upland plains. These soils formed in mixed eolian deposits. Slopes are 0 to 9 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, buffalograss, and fringed sagewort. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown loam about 9 inches thick underlain by indurated caliche. Soil reaction is moderately alkaline throughout.

The soil is moderately permeable above the indurated

layer. Available water holding capacity is 1 or 2 inches. Effective rooting depth is 6 to 20 inches.

Plack soils are used for range, wildlife habitat, road fill, and watershed.

Representative profile of Plack loam in an area of Tricon-Plack association, gently sloping, 1,915 feet east and 65 feet north of the southwest corner sec. 18, T. 23 N., R 27 E.

A11—0 to 4 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft dry, friable moist, slightly plastic wet; many fine roots; many fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

A12—4 to 9 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure; slightly hard dry, friable moist, slightly plastic wet; many fine roots; few fine tubular pores; strongly calcareous; moderately alkaline; abrupt wavy boundary.

Ccam—9 inches; white (10YR 8/2) indurated caliche, weathered and fractured in the upper few inches.

The A1 horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, and chroma of 2 or 3. It is loam or clay loam. The depth to indurated caliche is 6 to 20 inches.

PL—Plack fine sandy loam, 0 to 9 percent slopes. This nearly level to moderately sloping soil is on knolls and ridges at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Pastura, Tricon, and Texline soils. Pastura and Tricon soils occur throughout the mapping unit. Texline soils are below Plack soils on the landscape.

This soil has a profile similar to the one described as representative of the series, but it has a thin fine sandy loam surface layer and a fine sandy loam underlying layer. Runoff is medium. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIIs dryland; Shallow range site.

Ponil Series

The Ponil series consists of deep, well drained soils on mountainsides. These soils formed in alluvium, colluvium, and residuum derived mostly from shale. Slopes are 10 to 35 percent. Elevation is 7,000 to 8,500 feet. The vegetation is pinyon pine, one-seed juniper, Rocky Mountain juniper, and mountainmahogany and an understory of blue grama, little bluestem, mountain muhly, and western wheatgrass. Precipitation is 16 to 19 inches, the mean annual soil temperature is about 41° to 46° F, and the frost-free season is 100 to 120 days.

In a representative profile (fig. 5), the surface layer is grayish brown stony loam about 4 inches thick. It is covered with about 1 inch of decomposed and undecomposed forest litter. The subsoil is light yellowish brown and pale brown clay about 20 inches thick. The substratum is light gray clay about 36 inches thick. The depth to soft shale is 60 inches. Soil reaction is mildly alkaline in the surface layer, slightly acid to moderately alkaline in the subsoil, and moderately alkaline in the substratum.

Figure 5.—**Profile of Ponil stony loam showing clay subsoil and substratum.**

The soil is very slowly permeable. Available water capacity is 6 to 10 inches. Effective rooting depth is 40 to 60 inches.

Ponil soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Ponil stony loam in an area of Ponil-Vamer association, hilly, about 4 miles west of Cimarron or 3,400 feet west and 400 feet north of gauging station 6607:

O1&O2—1 inch to 0; decomposed and undecomposed forest litter.

A1—0 to 4 inches; grayish brown (10YR 5/2) stony loam, dark brown (10YR 3/3) moist; weak very fine granular structure; slightly hard dry, firm moist, slightly sticky and plastic wet; many fine and very fine roots; many fine and very fine interstitial pores; 15 percent rock fragments; mildly alkaline; clear smooth boundary.

B21t—4 to 15 inches; light yellowish brown (10YR

6/4) clay, yellowish brown (10YR 5/4) moist; moderate fine and medium angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and very fine roots; few very fine tubular pores; many thick clay films on peds; 5 percent rock fragments; slightly acid; clear smooth boundary.

B22t—15 to 24 inches; pale brown (10YR 6/3) clay, yellowish brown (10YR 5/4) moist; many distinct mottles of light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4) moist; moderate coarse prismatic structure parting to moderate coarse angular and subangular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and coarse roots; few fine tubular pores; many thick clay films on peds; 5 percent rock fragments; moderately alkaline; gradual smooth boundary.

C—24 to 60 inches; light gray (5Y 7/2) clay, light olive gray (5Y 6/2) moist; many distinct mottles of light yellowish brown (10YR 6/4), yellowish brown (10YR 5/6) moist; massive; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and coarse roots; common medium tubular pores; many pressure faces; 10 percent rock fragments; slightly calcareous; moderately alkaline.

Cr—60 inches; light gray (5Y 7/2) soft shale.

Rock fragments are angular sandstone and shale and range in size from gravel to stone. Soil reaction ranges from neutral to mildly alkaline in the A1 horizon. The A1 horizon has value of 4 through 6 dry and 2 through 4 moist and chroma of 2 through 4. It is stony loam or stony sandy clay loam that is 10 to 20 percent rock fragments. The B2t horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 through 6 dry and 3 through 5 moist, and chroma of 3 or 4. It is clay or silty clay that is 5 to 15 percent rock fragments. The C horizon has hue of 5Y, 2.5Y, or 10YR. It is clay or silty clay that is 5 to 20 percent rock fragments. The depth to shale is 40 to 60 inches.

PV—Ponil-Vamer association, hilly. This mapping unit is on ridges and foothills at elevations of 7,000 to 8,500 feet. It is about 70 percent a Ponil stony loam that has slopes of 10 to 35 percent and about 20 percent a Vamer stony loam that has slopes of 1 to 15 percent. The Ponil soil is on hillsides. The Vamer soil is on ridge crests.

About 10 percent of this mapping unit is included areas of Rock outcrop, Dargol, Stout, Deacon, La Brier, and Manzano soils. Rock outcrop occurs throughout the mapping unit. The Dargol and Stout soils are on ridgetops. Deacon, La Brier, and Manzano soils are in small valleys.

Ponil stony loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Vamer stony loam has a profile similar to the one described as representative of the series, but it has a stony loam surface layer. Runoff is medium to rapid. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for summer range, wildlife habitat, recreation, and watershed. Ponil stony loam in capability subclass VIIs dryland, Mountain Shale range site. Vamer stony loam in capability subclass VIs dryland, Mountain Grassland range site.

Raton Series

The Raton series consists of very shallow to shallow, well drained soils on basalt flows. These soils formed in fine textured residuum derived from basalt and other volcanic debris. Slopes are 3 to 50 percent. Elevation is 7,200 to 10,000 feet. The vegetation is blue grama, Arizona fescue, western wheatgrass, and little bluestem. Precipitation is 15 to 20 inches, the mean annual soil temperature is 42° to 47° F, and the frost-free season is 80 to 120 days.

In a representative profile, the surface layer is very dark grayish brown stony silt loam about 9 inches thick. The subsoil is brown very stony clay about 6 inches thick. The depth to basalt is 15 inches. Soil reaction is neutral throughout.

The soil is slowly permeable. Available water capacity is 1 to 3 inches. Effective rooting depth is 6 to 20 inches.

Raton soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Raton stony silt loam in an area of Raton-Barela complex 310 feet north and 465 feet west of the southeast corner sec. 26, T. 30 N., R. 26 E.

A11—0 to 5 inches; very dark grayish brown (10YR 3/2) stony silt loam, very dark brown (10YR 2/2) moist, moderate very fine granular structure; soft dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; 40 percent basalt stones, cobbles, and boulders and 5 percent gravel; neutral; abrupt smooth boundary.

A12—5 to 9 inches; very dark grayish brown (10YR 3/2) stony silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate very fine granular; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and very fine roots; few fine tubular pores; 45 percent basalt stones, cobbles, and boulders; neutral; clear smooth boundary.

B2t—9 to 15 inches; brown (7.5YR 4/2) very stony clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; few fine and very fine roots; few fine tubular pores; many moderately thick clay films on peds; 55 percent basalt stones, cobbles, and boulders and 10 percent gravel; neutral; abrupt wavy boundary.

R—15 inches; basalt.

Rock fragments are rounded basalt and range in size

from gravel to boulders. The A11 and A12 horizons have value of 3 or 4 dry and 2 or 3 moist and chroma of 1 through 3 dry and 1 or 2 moist. They are silt loam or loam that is 40 to 70 percent rock fragments. The B2t horizon has hue of 10YR, 7.5YR, or 5 YR, value of 4 or 5 dry and 2 through 4 moist, and chroma of 1 through 3 dry and 2 through 4 moist. It is clay, silty clay, clay loam, or silty clay loam that is 40 to 70 percent rock fragments. The depth to bedrock ranges from 6 to 20 inches.

Raton-Wellsville association, steep, (RE) is outside the range defined for the Raton series because it lacks a B2t horizon and has a very cobbly loam C horizon over bedrock. These differences, however, do not affect use and management.

Ra—Raton-Barela complex. This mapping unit is on the tops of basalt mesas at elevations of 7,500 to 8,700 feet. Slopes are 3 to 15 percent. This unit is about 65 percent a Raton stony silt loam that has slopes of 3 to 15 percent and is intermingled with about 25 percent of a Barela stony silt loam that has slopes of 3 to 9 percent.

About 10 percent of this mapping unit is included areas of Rock outcrop and Bandera and Yankee soils. Rock outcrop occurs throughout the mapping unit. Bandera soils are on the side slopes of extinct volcano cones. Yankee soils are on the smooth stone-free parts.

Raton stony silt loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Barela stony loam has a profile similar to the one described as representative of the series, but it has a stony surface layer. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIIs dryland. Raton soil in Mountain Stony Loam range site. Barela soil in Mountain Grassland range site.

RD—Raton-Dalcan association, rolling. This mapping unit is on the tops of basalt mesas at elevations of 7,200 to 9,000 feet. It is about 55 percent a Raton stony silt loam that has slopes of 5 to 25 percent and about 30 percent a Dalcan stony silt loam that has slopes of 3 to 9 percent. The Raton soil is on pressure ridges and canyon walls. The Dalcan soil is on fans between pressure ridges.

About 15 percent of this mapping unit is included areas of Bandera, Barela, and Burnac soils and Rock outcrop. The Bandera soil is on and near cinder cones. The Barela soil is on benches. The Burnac soil is on hills. Rock outcrop is on pressure ridges.

Raton stony silt loam has a profile similar to the one described as representative of the series, but it is shallower to bedrock. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Dalcan stony silt loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, wildlife habitat, recreation, watershed, and woodland. Capability subclass VIIs dryland; Mountain Stony Loam range site.

RE—Raton-Wellsville association, steep. This mapping unit is on mountainsides at elevations of 8,500 to 10,000 feet. It is about 45 percent a Raton cobbly loam that has slopes of 35 to 50 percent and about 40 percent a Wellsville cobbly loam that has slopes of 25 to 40 percent. The Raton soil is on the higher positions, and the Wellsville soil is on the lower, smoother positions.

About 15 percent of this mapping unit is included areas of Rubble land, Rock outcrop, and Bundo, Cypher, Moreno, and Morval soils. Rock outcrop and Bunda and Cypher soils are usually at the higher positions of the elevation range. Rubble land is at the base of steep slopes. Moreno and Morval soils are at the lower positions.

Raton cobbly loam has a profile similar to the one described as representative of the series, but it has a cobbly loam surface layer and a very cobbly loam layer over the intrusive bedrock. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

Wellsville cobbly loam has a profile similar to the one described as representative of the series, but it has a higher content of rock fragments in the subsoil and substratum and is slightly coarser. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, watershed, and recreation. Raton soil in capability subclass VIIs dryland, Subalpine Grassland range site. Wellsville soil in capability subclass VIIe dryland, Subalpine Grassland range site.

Ring Series

The Ring series consists of deep, well drained soils on outwash terraces. These soils formed in alluvium derived from sandstone, shale, and intrusive rocks. Slopes are 0 to 5 percent. Elevation is 7,900 to 8,600 feet. The vegetation is ponderosa pine, blue grama, Kentucky bluegrass, mountain muhly, and pine dropseed. Precipitation is 18 to 22 inches, the mean annual soil temperature is 44° to 47° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is dark grayish brown cobbly loam about 6 inches thick. It is covered with about 1 inch of decomposing forest litter. The subsoil is brown cobbly sandy clay about 33 inches thick. The substratum is yellowish brown cobbly sandy clay loam. Soil reaction is slightly acid in the surface layer, slightly acid to neutral in the subsoil, and neutral in the substratum.

The soil is moderately slowly permeable. Available water capacity is 3 to 7 inches. Effective rooting depth is 60 inches or more.

Ring soils are used for range, wildlife habitat, recreation, woodland, and watershed.

Representative profile of Ring cobbly loam in an area of Ring-Brycan association, moderately sloping, about 12 miles southwest of Vermejo Park Headquarters or 1,750 feet north and 100 feet west of the Ring Place Cowcamp Cabin:

O1&O2—1 inch to 0; decomposed and decomposing forest litter.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish

brown (10YR 3/2) moist; moderate very fine granular structure; soft dry, friable moist, slightly sticky and plastic wet; many very fine and fine and few coarse roots; many very fine interstitial pores; 10 percent stones, cobbles, and gravel; slightly acid; clear wavy boundary.

B21t—6 to 14 inches; brown (7.5YR 5/4) cobbly sandy clay, brown (7.5YR 4/4) moist; weak medium and coarse subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; common fine and very fine and few coarse roots; few very fine tubular pores; common moderately thick clay films on peds and rock fragments; 25 percent stones, cobbles, and gravel; slightly acid; clear wavy boundary.

B22t—14 to 27 inches; brown (7.5YR 5/4) cobbly sandy clay, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; few fine and coarse roots; few very fine tubular pores; many moderately thick clay films on peds and rock fragments; 50 percent stones, cobbles, and gravel; neutral; gradual wavy boundary.

B23t—27 to 39 inches; brown (7.5 YR 5/4) cobbly sandy clay, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; few fine, very fine, and coarse roots; few very fine tubular pores; common moderately thick clay films on peds and rock fragments; 65 percent stones, cobbles, and gravel; neutral; gradual wavy boundary.

C—39 to 60 inches; yellowish brown (10YR 5/4) cobbly sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard dry, firm moist, sticky and plastic wet; few fine, medium, and coarse roots; few very fine tubular pores; 50 percent stones, cobbles, and gravel; neutral.

Rock fragments are about 45 percent rounded stones, about 40 percent cobbles, and about 15 percent pebbles. The A1 horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3 dry or moist. It is 10 to 40 percent rock fragments. The B2t horizons has hue of 7.5 YR or 10YR and chroma of 2 through 4 dry or moist. It is 20 to 40 percent rock fragments in the upper part and 40 to 65 percent in the lower part. The C horizon has hue of 10YR or 7.5YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 4 through 6 dry or moist. It is 50 to 75 percent rock fragments.

RG—Ring-Brycan association, moderately sloping. This mapping unit is on alluvial fans at elevations of 7,900 to 8,600 feet. It is about 50 percent a Ring cobbly loam that has slopes of 0 to 5 percent and 40 percent a Brycan loam that has slopes of 0 to 3 percent. The Ring soil is in the stonier areas in the unit. The Brycan soil is on the smoother, grassed positions.

About 10 percent of this mapping unit is included areas of Vamer and Dargol soils and Rock outcrop. The Vamer and Dargol soils are on the higher positions. Rock outcrop occurs throughout the mapping unit.

Ring cobbly loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Brycan loam has a profile similar to the one described as representative of the series, but it has a thicker, darker surface layer. Runoff is medium. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This mapping unit is used for range, irrigated and dryland crops, wildlife habitat, recreation, woodland, and watershed. Ring soil in capability subclass VIs dryland; woodland suitability group 6o1. Brycan soil in capability unit IVe–2 irrigated, IVe–1 (RM) dryland; Mountain Valley range site.

Riverwash

Riverwash consists of recent alluvial deposits along the flood plains of major drainageways. It is mainly stratified sand and loamy sand and varying amounts of gravel and cobbles. It includes small areas of limestone, sandstone, or shale outcrops. Slopes are 0 to 5 percent. Elevation is 5,800 to 7,000 feet. Precipitation is 14 to 17 inches. The mean annual soil temperature is 47° to 53° F. The frost-free season is 120 to 160 days.

Riverwash is used for wildlife habitat and watershed.

RV—Riverwash is along the flood plains of stream channels at elevations of 5,800 to 7,000 feet. Slopes are 0 to 3 percent.

About 5 percent of this mapping unit is included areas of Rock outcrop, such as limestone, sandstone, and shale.

Runoff is slow. Flooding is frequent. The hazards of water erosion and soil blowing are high.

Riverwash is used for wildlife habitat and watershed. Capability subclass VIIIw dryland.

Rz—Riverwash-Manzano complex. This mapping unit is on the flood plains of major streams. It is about 50 percent Riverwash having slopes of 0 to 5 percent and about 30 percent a Manzano loam that has slopes of 0 to 3 percent. Riverwash is on lower benches adjacent to the streams. Manzano loam is on the higher benches and in elevated areas throughout the unit.

About 20 percent of this unit is included areas of Seelez, La Brier, and Vermejo soils and Rock outcrop.

Riverwash has slow runoff and is flooded frequently. The hazards of water erosion and soil blowing are high.

Manzano loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is very slow. The hazards of water erosion and soil blowing are moderate. Flooding is common.

This unit is used for wildlife habitat, range, watershed, and irrigated and dryland crops. Capability subclass VIw dryland. Manzano loam in Loamy range site.

Rock Outcrop

Rock outcrop is nearly vertical escarpments, sliderock, rock faces, squeeze-ups, and smooth ridges and shelves of limestone, shale, sandstone, basalt, and intrusive rocks. It is throughout the survey area at elevations ranging from 5,500 to 12,000 feet.

Rock outcrop is sandstone where it is associated with Travessilla and Bernal soils and is shale or sandstone where it is associated with Mion and Midnight soils. It is limestone where it is associated with Laporte soils and is basalt and sandstone where it is associated with La Brier soils and Aridic Argiustolls.

Rock outcrop has some use as watershed and wildlife habitat. It is mapped only with Bernal, La Brier, Laporte, Meloche, Midnight, Mion, Oro Grande, Rombo, and Travessilla soils and Aridic Argiustolls and Ustochrepts.

Rombo Series

The Rombo series consists of moderately deep, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from sandstone and shale. Slopes are 25 to 50 percent. Elevation is 7,000 to 9,000 feet. The vegetation is Gambel oak, mountain-mahogany, pinyon pine, one-seed juniper, Rocky Mountain juniper, blue grama, sideoats grama, big bluestem, and little bluestem. Precipitation is 15 to 18 inches, the mean annual soil temperature is 45° to 47° F, and the frost-free season is 100 to 120 days.

In a representative profile, the surface layer is grayish brown cobbly silty clay loam about 3 inches thick. The subsoil is grayish brown cobbly silty clay loam and cobbly clay about 27 inches thick. The depth to mixed black and grayish brown partially weathered shale is 30 inches. Soil reaction is mildly alkaline throughout.

The soil is slowly permeable. Available water capacity is 4 or 5 inches. Effective rooting depth is 22 to 40 inches.

Rombo soils are used for wildlife habitat, recreation, watershed, and range. They are mapped only with Midnight soils and Rock outcrop.

Representative profile of Rombo cobbly silty clay loam in an area of Midnight-Rombo-Rock outcrop complex, approximately 12 miles west of Raton, or 3.8 miles up Potato Canyon from the junction of Potato Canyon Road with the Canadian River Road, and 160 feet northwest up south-facing slope from the junction of a small drainageway from the northwest with the Potato Canyon drainage:

A1—0 to 3 inches; grayish brown (2.5Y 5/2) cobbly silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate very fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine, medium, and coarse roots; many fine tubular and interstitial pores; 15 percent angular gravel, cobbles, and stones; mildly alkaline; clear wavy boundary.

B2—3 to 20 inches; grayish brown (2.5Y 5/2) cobbly silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard dry, very firm moist, sticky and very plastic wet; common fine, medium, and coarse roots; few fine tubular pores; 25 percent angular gravel and cobbles; mildly alkaline; clear wavy boundary.

B3ca—20 to 30 inches; grayish brown (2.5Y 5/2) cobbly clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard dry, very firm moist, sticky and very plastic wet; few fine roots; few fine tubular pores; 25 percent angular gravel and cobbles; moderately calcareous; common lime mycelia and common lime masses on underside of rock fragments; mildly alkaline; clear wavy boundary.

C—30 to 40 inches; mixed black (N 2/0) and grayish brown (2.5Y 5/2) partially weathered shale, black (N 2/0) and very dark grayish brown (2.5Y 3/2) moist; massive; moderately calcareous; mycelia of lime in fractures.

Rock fragments are angular sandstone and shale and range in size from gravel to boulders. The A1 horizon has hue of 2.5Y or 10YR, value of 4 or 5 dry and 2 or 3 moist, and chroma of 2 or 3 dry and moist. It is silty clay loam, clay loam, or loam that is 15 to 50 percent rock fragments. The B2 horizon has hue of 2.5Y or 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 through 4 dry and moist. It is silty clay loam, clay loam, or clay that is 15 to 30 percent rock fragments. The depth to shale is 22 to 40 inches.

Saladon Series

The Saladon series consists of deep, very poorly drained soils in depressions and swales and on flats on basalt flows. These soils formed in fine textured alluvium derived mostly from basalt and other volcanic debris. Slopes are 0 to 5 percent. Elevation is 8,000 to 10,000 feet. The vegetation is grasses, sedges, and iris. Precipitation is 18 to 20 inches, the mean annual soil temperature is about 40° to 45° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is black mucky silty clay and clay about 16 inches thick. It is underlain by olive clay and dark brown clay. Soil reaction is neutral throughout.

The soil is very slowly permeable. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. The depth to the water table is 0 to 48 inches. Saladon soils are used for range, wildlife habitat, watershed, and recreation.

Representative profile of Saladon mucky silty clay, 0 to 5 percent slopes, 2,500 feet west and 510 feet north of the southeast corner sec. 13, T. 24 N., R. 16 E.

A11—0 to 4 inches; black (N 2/0) moist, mucky silty clay, black (N 2/0) dry; weak fine and very fine granular structure; hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine and common medium roots; many very fine and few fine interstitial pores; neutral; clear smooth boundary.

A12—4 to 9 inches; black (N 2/0) moist, clay, very dark gray (N 3/0) dry; strong fine granular structure; very hard dry, firm moist, slightly sticky and very plastic wet; many fine, very fine, and medium roots; few fine tubular pores; neutral; clear smooth boundary.

A13—9 to 16 inches; black (N 2/0) moist, clay, very dark gray (N 3/0) dry; moderate

very fine granular structure; very hard dry, firm moist, slightly sticky and very plastic wet; many fine, very fine, and medium roots; very few fine tubular pores; neutral; abrupt wavy boundary.

C1g—16 to 27 inches; olive (5Y 4/3) moist, clay, olive gray (5Y 5/2) dry; common fine faint mottles of dark olive gray (5Y 3/2) and common medium faint mottles of olive brown (2.5Y 4/4); moderate fine subangular blocky structure; very hard dry, firm moist, slightly sticky and very plastic wet; common fine and very fine and many medium roots; many pressure faces; neutral; abrupt wavy boundary.

C2g—27 to 60 inches; dark brown (10YR 4/3) moist, clay, brown (10YR 5/3) dry; common medium faint olive (5Y 4/3), common fine distinct light gray (N 7/0), and few fine distinct very dark gray (N 3/0) mottles; massive; very hard dry, firm moist, slightly sticky and very plastic wet; few fine and common medium roots; 10 percent fine gravel; neutral.

The A1 horizon has value of 2 or 3 dry and moist. It is mucky silty clay, mucky clay, and mucky clay loam, clay, or silty clay. The C1g and C2g horizons have value of 4 or 5 moist and 5 or 6 dry and chroma of 1 through 3. They are clay, silty clay loam, or clay loam.

SaC—Saladon mucky silty clay, 0 to 5 percent slopes. This mapping unit is in mountain meadows in depressions, in swales, and on flats at elevations of 8,000 to 10,000 feet.

About 15 percent of this mapping unit is included areas of Hillery and Burnac soils and basalt Rock outcrop and small intermittent lakes. The Hillery and Burnac soils are near the edges of the mapping unit and at the higher positions. Rock outcrop and intermittent lakes are scattered throughout.

Saladon mucky silty clay has the profile described as representative of the series. Runoff is very slow to ponded. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. This mapping unit is subject to frequent flooding.

This soil is used for range, wildlife habitat, and watershed. Capability subclass VIw dryland; Meadow range site.

Seelez Series

The Seelez series consists of deep, well drained soils on uplands and in bottom lands and swales. These soils formed in eolian and alluvial deposits. Slopes are 0 to 5 percent. Elevation is 5,800 to 7,000 feet. The vegetation is sand dropseed, blue grama, yucca, and annuals. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown fine sandy loam about 2 inches thick. The next layer is yellowish brown fine sandy loam about 13 inches thick. The substratum is light yellowish brown and yellowish brown fine sandy loam and loamy sand. Soil reaction is mildly alkaline to moderately alkaline throughout the profile.

The soil is rapidly permeable. Available water capacity is 5 to 7 inches. Effective rooting depth is more than 60 inches.

Seelez soils are used for range, irrigated crops, wildlife habitat, and watershed.

Representative profile of Seelez fine sandy loam in an area of Dalhart-Seelez association, gently sloping, 1,100 feet north and 2,975 feet east of the southwest corner sec. 33, T. 28 N., R. 23 E.

A1—0 to 2 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; soft dry, very friable moist; many fine and very fine roots; common fine interstitial pores; mildly alkaline; abrupt smooth boundary.

AC—2 to 15 inches; yellowish brown (10YR 5/4) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure; soft dry, very friable moist; many fine and very fine roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

C1ca—15 to 36 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; soft dry, very friable moist; few fine and very fine roots; common fine tubular pores; strongly calcareous; few fine irregularly shaped filaments of lime; mildly alkaline; gradual smooth boundary.

C2—36 to 68 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable moist; few very fine and fine roots; few very fine tubular pores; moderately calcareous; moderately alkaline.

The depth to calcareous material ranges from 10 to 30 inches. The profile has hue of 10YR to 7.5YR. The A and AC horizons have value of 4 or 5 dry and 3 or 4 moist and chroma of 3 or 4. The A horizon is fine sandy loam or loamy fine sand. The C horizon has value of 5 through 7 dry and 4 through 6 moist.

The Seelez soils, SeB and SnA, are brown and yellowish brown to a depth of 20 inches or more. This difference, which is outside the range defined for the series, does not affect the use and management.

SeB—Seelez sandy loam, dark, 0 to 3 percent slopes. This nearly level to gently undulating soil is on flood plains and in swales at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Manzano, Gruver, Dallam, and Dioxice soils. Manzano soils are throughout the mapping unit. Gruver, Dallam, and Dioxice soils are along the edges of the unit.

Seelez sandy loam has a profile similar to the one described as representative of the series, but it is brown and yellowish brown below a depth of 20 inches. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high.

This mapping unit is used for range, dryland crops, wildlife habitat, and watershed. Capability unit IIIe-3 dryland; Sandy range site.

SfC—Seelez fine sandy loam, 0 to 5 percent slopes.

This level to gently sloping soil is on fans at elevations of 5,800 to 6,600 feet.

About 15 percent of this mapping unit is included areas of Dalhart soils, Seelez fine sandy loam that has slopes greater than 5 percent, and soils underlain by buried soils or with shale at a depth of less than 40 inches. The Dalhart soil is in swales and depressions. The Seelez soil that has slopes greater than 5 percent is on the lee side of terraces.

Seelez fine sandy loam has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. This soil is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Sandy range site.

SnA—Seelez fine sandy loam, dark, 0 to 1 percent slopes. This level soil is in swales at elevations of 6,000 to 7,000 feet.

About 10 percent of this mapping unit is included areas of Manzano and La Brier soils. Manzano soils are throughout the mapping unit. La Brier soils are in swales and depressions.

Seelez fine sandy loam has a profile similar to the one described as representative of the series, but it is brown and yellowish brown below a depth of 20 inches. Runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

This soil is used for irrigated crops, range, wildlife habitat, watershed, and homesites. Capability unit IIe–2; irrigated, subclass VIe dryland; Sandy range site.

Stout Series

The Stout series consists of shallow to very shallow, well drained soils on ridges and mesas. These soils formed in residuum derived from sandstone. Slopes are 1 to 9 percent. Elevation is 7,300 to 9,000 feet. The vegetation is ponderosa pine, pinyon pine, Rocky Mountain juniper, Gambel oak, mountainmahogany, mountain muhly, pine dropseed, and little bluestem. Precipitation is 18 to 22 inches, the mean annual soil temperature is 42° to 46° F, and the frost-free season is 100 to 120 days.

In a representative profile, the surface layer is grayish brown cobbly sandy loam about 3 inches thick. It is covered with about 1 inch of decomposing forest litter. Under the surface layer is a very pale brown cobbly sandy loam about 13 inches thick. Sandstone is at a depth of 16 inches. Soil reaction is medium acid.

The soil is rapidly permeable. Available water capacity is 1 to 2 inches. Effective rooting depth is 6 to 20 inches.

Stout soils are used for wildlife habitat, recreation, and woodland, range, and watershed. They are mapped only with Dargol and Vamer soils.

Representative profile of Stout cobbly sandy loam in an area of Dargol-Stout-Vamer association, sloping, about 16 miles west of Raton or 850 feet north and 30 feet west of Armstrong Lookout:

O1&O2—1 inch to 0; decomposed and undecomposed forest litter.

A1—0 to 3 inches; grayish brown (10YR 5/2) cobbly sandy loam, dark brown (10YR 3/2) moist; weak fine granular structure; soft dry, very friable moist; many fine roots; many very fine interstitial pores; 15 percent rock fragments; medium acid; clear smooth boundary.

C—3 to 16 inches; very pale brown (10YR 7/4) cobbly sandy loam, yellowish brown (10YR 5/4) moist; massive; soft dry, very friable moist; common fine roots; few very fine tubular pores; 20 percent rock fragments; medium acid; abrupt wavy boundary.

R—16 inches; weathering sandstone.

Rock fragments are angular sandstone and are about 50 percent cobbles, 35 percent stones, and 15 percent gravel. The A horizon has value of 5 through 7 dry and 3 through 6 moist and chroma of 2 through 4 dry and moist. It is sandy loam or loamy sand that is 10 to 20 percent rock fragments. The C horizon has hue of 10YR or 7.5YR, value of 5 through 7 dry and moist, and chroma of 3 or 4 dry and moist. It is sandy loam or fine sandy loam that is 10 to 30 percent rock fragments. The depth to bedrock is 6 to 20 inches.

Swastika Series

The Swastika series consists of deep, well drained soils on uplands. These soils formed in fine textured residuum derived from shale. Slopes are 0 to 7 percent. Elevation is 5,900 to 7,500 feet. The vegetation on the nonsaline phase is blue grama, western wheatgrass, and galleta and on the saline phase is alkali sacaton and inland saltgrass. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown silt loam about 4 inches thick. The subsoil is brown, pale brown, and light brownish gray silty clay about 26 inches thick. The substratum is light yellowish brown silty clay loam. Soil reaction is neutral in the surface layer, neutral to moderately alkaline in the subsoil, and moderately alkaline in the substratum.

The soil is slowly permeable. Available water capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more.

Swastika soils are used for irrigated crops, range, wildlife habitat, recreation, homesites, and watershed.

Representative profile of Swastika silt loam in an area of Swastika association, gently sloping, 75 feet south and 1,400 feet east of the northwest corner sec. 26, T. 26 N., R. 24 E.

A1—0 to 4 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; common fine tubular pores; neutral; clear smooth boundary.

B1—4 to 11 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure; hard

dry, firm moist, slightly sticky and slightly plastic wet; many fine and very fine roots; common fine tubular pores; neutral; clear smooth boundary.

B21t—11 to 16 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine roots; common fine tubular pores; many moderately thick clay films on peds; slightly calcareous; neutral; clear smooth boundary.

B22t—16 to 21 inches; light brownish gray (10YR 6/2) silty clay, brown (10YR 4/3) moist; moderate fine angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine roots; common fine tubular pores; many thick clay films on peds; slightly calcareous; mildly alkaline; gradual smooth boundary.

B23tca—21 to 30 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard dry, firm moist, slightly sticky and very plastic wet; few fine roots; common fine tubular pores; moderately calcareous; medium irregular soft masses of segregated lime; moderately alkaline; gradual smooth boundary.

Cca—30 to 64 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; hard dry, firm moist, slightly sticky and plastic wet; few fine roots; few fine vesicular and few fine tubular pores; strongly calcareous; few fine irregular soft masses of segregated lime; moderately alkaline.

The A1 horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, and chroma of 2 or 3 dry and moist. It is silt loam, loam, fine sandy loam, or silty clay loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 2 through 5 dry and moist. It is silty clay, clay, or silty clay loam. The Cca horizon has hue of 10YR or 7.5YR, value of 6 or 7 dry and 4 through 7 moist, and chroma of 3 or 4 dry and moist. It is silty clay loam or clay loam.

SoA—Swastika silt loam, 0 to 1 percent slopes. This level soil is on uplands at elevations of 5,900 to 7,000 feet.

About 10 percent of this mapping unit is included areas of La Brier soils, Swastika silt loam that has slopes of 1 to 3 percent, and Swastika silty clay loam that has slopes of 0 to 3 percent. The La Brier soil is in small swales. The other soils are throughout the mapping unit.

Swastika silt loam, 0 to 1 percent slopes, has a profile similar to the one described as representative of the series, but it has a thicker surface layer. Runoff is slow. The hazards of water erosion and soil blowing are slight.

This unit is used for irrgated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIs–1 irrigated, subclass VIs dryland; Loamy range site.

SpD—Swastika silt loam, 3 to 7 percent slopes. This gently to moderately sloping soil is on fans and plains at elevations of 5,900 to 6,400 feet. There is slight sheet erosion on this soil.

About 10 percent of this mapping unit is included areas of Colmor soils, Swastika silty clay loam that has slopes of 3 to 7 percent, and a soil similar to the Swastika soil that has shale at a depth of 40 to 60 inches. The Colmor soil is in lower positions in the mapping unit. Swastika silty clay loam is throughout. The soil similar to the Swastika soil is on the higher positions.

Swastika silt loam, 3 to 7 percent slopes, has a profile similar to the one described as representative of the series, but the depth to the substratum is less than 30 inches. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This unit is used for irrigated crops, range, wildlife habitat, and watershed. Capability unit IIIe–1 irrigated, subclass VIe dryland; Loamy range site.

SsB—Swastika silty clay loam, 1 to 3 percent slopes. This nearly level soil is on fans and plains at elevations of 5,900 to 7,000 feet.

About 10 percent of this mapping unit is included areas of La Brier soils, Swastika silt loam that has slopes of 0 to 3 percent, and a soil similar to the Swastika soil that has shale at a depth of 40 to 60 inches. The La Brier soil is in small swales. Swastika silt loam is throughout the mapping unit. The soil similar to the Swastika soil is on slightly higher positions.

Swastika silty clay loam has a profile similar to the one described as representative of the series, but it has a silty clay loam surface layer. Runoff is medium. The hazards of erosion and soil blowing are moderate.

This unit is used for irrigated crops, range, wildlife habitat, homesites, and watershed. Capability unit IIIe–8 irrigated, subclass VIe dryland; Clayey range site.

St—Swastika silty clay loam, saline. This level to nearly level soil is on fans and plains at elevations of 5,900 to 7,000 feet. Slopes are 0 to 3 percent. This soil is moderately saline.

About 15 percent of this mapping unit is included areas of La Brier soils, saline; Vermejo soils, saline; and Swastika soils, nonsaline. La Brier, saline, and Vermejo, saline soils are in swales and depressions. Swastika soils are in slightly elevated areas and along the boundaries of this unit.

Swastika silty clay loam, saline, has a profile similar to the one described as representative of the series, but it has a saline silty clay loam surface layer and visible salt crystals in the subsoil. It has a seasonal water table at a depth of about 6 feet. Available water capacity is 5 to 7 inches. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This soil is used for irrigated crops, range, wildlife habitat, and watershed. Capability unit IVs–9 irrigated, subclass VIs dryland; Salt Flats range site.

SW—Swastika association, gently sloping. This map-

ping unit is on uplands at elevations of 6,000 to 7,500 feet. It is about 60 percent a Swastika silt loam that has 1 to 5 percent slopes and about 20 percent a soil similar to Swastika soils that has a pale brown or light brown surface layer. Both soils occur throughout the mapping unit, but Swastika soils are generally on the smoother, less sloping positions.

About 20 percent of this mapping unit is included areas of Colmor, La Brier, Litle, Mion, Dalhart, and Seelez soils and a soil similar to this Swastika soil that has a layer with a high content of lime at a depth of about 22 inches. La Brier soils are on flats and in swales. Litle, Mion, Dalhart, and Seelez soils and the soil similar to Swastika soils are throughout the mapping unit but are generally on the higher positions. Colmor soils are on the smoother positions.

Swastika silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, recreation, homesites, and watershed. Capability subclass VIe dryland; Loamy range site.

SX—Swastika-La Brier association, saline. This mapping unit is in upland swales on flats below reservoirs and canals at elevations of 5,900 to 7,000 feet. It is about 50 percent Swastika silt loam that has slopes of 0 to 5 percent and about 35 percent a La Brier silty clay loam that has slopes of 0 to 2 percent. The Swastika soil is on flat and gentle slopes. The La Brier soil is in flat and concave swales.

About 15 percent of this mapping unit is included areas of Vermejo, Litle, and Colmor soils. The Vermejo and Litle soils have no regular pattern. The Colmor soils are closely associated with Swastika soils on the higher positions.

Swastika silt loam has a profile similar to the profile described as representative of the series, but it is saline and has a thicker surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate. A seasonal water table is at a depth of about 6 feet. Available water capacity is 7 or 8 inches.

La Brier silty clay loam has a profile similar to the one described as representative of the series, but it is saline. Available water capacity is 5 to 7 inches. Runoff is medium. The hazards of water erosion and soil blowing are moderate. A seasonal water table is at a depth of about 6 feet. This soil is subject to infrequent flooding.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Capability subclass VIs dryland; Salt Flats range site.

Tafoya Series

The Tafoya series consists of deep, well drained soils on hillsides. These soils formed in alluvium and colluvium derived from mixed rocks. Slopes are 9 to 45 percent. Elevation is 6,500 to 7,700 feet. The vegetation is blue grama, sideoats grama, little bluestem, and scattered pinyon pine. Precipitation is 14 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 120 to 150 days.

In a representative profile, the surface layer is dark grayish brown stony loam about 6 inches thick. The subsoil is brown and light brown stony silt loam and gravelly clay about 33 inches thick. The substratum is pale brown gravelly sandy clay loam underlain by bedrock at a depth of 46 inches. Soil reaction is neutral.

The soil is slowly permeable. Available water capacity is 2 to 5 inches. Effective rooting depth is 40 to 60 inches.

Tafoya soils are used for range, wildlife habitat, recreation, and watershed. They are mapped only with Oro Grande soils.

A representative profile of Tafoya stony loam in an area of Oro Grande-Tafoya association, about 20 miles east of Maxwell, New Mexico, or 320 feet south and 160 feet east of the northwest corner of sec. 33, T. 27 N., R. 26 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine roots; many fine interstitial pores; 15 percent stones, 5 percent cobbles, 10 percent gravel; neutral; clear wavy boundary.

B1—6 to 14 inches; brown (7.5YR 4/2) stony silt loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; hard dry, friable moist, slightly sticky and plastic wet; many fine roots; many fine interstitial and few fine tubular pores; 20 percent stones, 20 percent cobbles, 10 percent gravel; neutral; clear wavy boundary.

B2t—14 to 25 inches; light brown (7.5YR 6/4) very gravelly clay, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; common fine roots; few fine tubular and interstitial pores; common thin clay films on peds and surfaces of rock fragments; 50 percent gravel, 10 percent cobbles, 5 percent stones; neutral; clear wavy boundary.

B3—25 to 39 inches; brown (7.5YR 5/4) very gravelly clay, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard dry, firm moist, plastic wet; few fine roots; few fine tubular pores; 50 percent fine gravel, 10 percent cobbles; neutral; clear wavy boundary.

C—39 to 46 inches; pale brown (10YR 6/3) gravelly sandy clay loam, brown (10YR 5/3) moist; massive; hard dry, friable moist, plastic wet; few fine roots; few fine tubular pores; 30 percent gravel and 10 percent cobbles; neutral; gradual wavy boundary.

R—46 inches; igneous bedrock.

The thickness of the solum is 30 to 49 inches, and the depth to bedrock is 40 to 60 inches. Rock fragments make up 35 to 80 percent of the profile. Soil reaction ranges from neutral to mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 4

or 5 and 2 or 3 moist, and chroma of 2 or 3 dry and moist. It is loam or silt loam that is 5 to 15 percent stones, 5 to 30 percent cobbles, and 10 to 15 percent gravel.

The B2t horizon has hue of 7.5YR or 10YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 2 through 4 dry and moist. It is clay, silty clay, or clay loam that is 35 to 80 percent rock fragments. The B2t horizon is noncalcareous to slightly calcareous.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 or 4. It is sandy clay loam, clay loam, or clay that is 10 to 60 percent rock fragments. The C horizon is noncalcareous to strongly calcareous.

Texline Series

The Texline series consists of deep, well drained soils on upland plains. These soils formed in eolian deposits of calcareous materials. Slopes are 0 to 7 percent. Elevation is 6,000 to 6,500 feet. The vegetation is blue grama and sideoats grama. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile the surface layer is grayish brown fine sandy loam and loam about 16 inches thick. The subsoil extends to a depth of 66 inches. In a sequence from the top, it is a pale brown loam, a pinkish gray clay loam and sandy clay loam, and a reddish yellow gravelly sandy clay loam. The soil is moderately alkaline throughout.

The soil is moderately permeable. Available water capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more.

Texline soils are used for range, dryland crops, wildlife habitat, and watershed.

Representative profile of Texline fine sandy loam, 0 to 7 percent slopes, 760 feet south and 230 feet east of the northwest corner sec. 2, T. 24 N., R. 27 E.

A1—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft dry, very friable moist, slightly plastic wet; many fine roots; many fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

A3—5 to 16 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure; soft dry, very friable moist, slightly plastic wet; many fine and very fine roots; common fine tubular pores; strongly calcareous; about 14 percent calcium carbonate; moderately alkaline; gradual wavy boundary.

B21tca—16 to 24 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; soft dry, friable moist, slightly sticky and slightly plastic wet; common fine roots; few fine tubular and many fine interstitial pores; few thin clay films in pores and bridges; strongly calcareous; about 25 percent calcium carbonate; few fine irregularly shaped soft masses of lime; moderately alkaline; clear wavy boundary.

B22tca—24 to 42 inches; pinkish gray (7.5YR 7/2) clay loam, light brown (7.5YR 6/4) moist; moderate coarse prismatic structure; hard dry, friable moist, slightly sticky and plastic wet; few fine roots; few fine tubular pores; common thin clay films on peds and in pores; 5 percent gravel; strongly calcareous, about 30 percent calcium carbonate, disseminated and in many irregularly shaped seams and masses of lime; moderately alkaline; clear wavy boundary.

B23tca—42 to 53 inches; pinkish gray (7.5YR 7/2) sandy clay loam, light brown (7.5YR 6/4) moist; weak coarse prismatic structure; hard dry, friable moist, slightly sticky and plastic wet; few fine roots; few fine tubular pores; few thin clay films on peds; 10 percent gravel; strongly calcareous, common fine and medium threads and masses of lime; moderately alkaline; gradual wavy boundary.

B24t—53 to 66 inches; reddish yellow (7.5YR 6/6) gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak coarse prismatic structure; hard dry, friable moist, slightly sticky and plastic wet; few fine roots; few fine tubular pores; few thin clay films on faces of peds; fine gravel in discontinuous lenses; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR and chroma of 2 or 3. It is fine sandy loam or loam. The B2t horizon has chroma of 2 through 6. It is sandy clay loam, loam, or clay loam.

TED—Texline fine sandy loam, 0 to 7 percent slopes. This nearly level to gently rolling soil is on uplands at elevations of 6,000 to 6,500 feet.

About 15 percent of this mapping unit is included areas of Plack, Dioxice, Gruver, Dallam, and Manzano soils. Plack soils are on ridgecrests. Dioxice soils are throughout the area. Gruver and Dallam soils are on flatter areas, and Manzano soils are in swales. Small areas with slopes ranging up to 15 percent are also included.

Texline fine sandy loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is moderate, and the hazard of soil blowing is high.

This unit is used for range, dryland crops, wildlife habitat, and watershed. Capability subclass VIe dryland; Sandy range site.

Thunderbird Series

The Thunderbird series consists of moderately deep, well drained soils on basalt flows. These soils formed mostly in residuum and colluvium derived from basalt. Slopes are 1 to 9 percent. Elevation is 6,500 to 7,500 feet. The vegetation is blue grama, western wheatgrass, fringed sagewort, and broom snakeweed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is dark grayish brown stony silt loam about 4 inches thick. The subsoil is dark grayish brown and brown clay and gravelly clay about 20 inches thick. The depth to basalt is 24 inches. The soil is neutral to mildly alkaline throughout.

The soil is slowly permeable. Available water capacity is 2 or 3 inches. Effective rooting depth is 20 to 40 inches.

Thunderbird soils are used for range, wildlife habitat, and watershed.

A representative profile of Thunderbird stony silt loam in an area of Thunderbird-Torreon association, undulating, about 20 miles east of Maxwell, 400 feet south and 2,200 feet west of the northeast corner of sec. 17, T. 27 N., R. 26 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) stony silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard dry, friable moist, slightly plastic wet; many fine and very fine roots; few fine tubular pores; 10 percent basalt stones; neutral; clear smooth boundary.

B1t—4 to 9 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard dry, firm moist, sticky and very plastic wet; many fine roots; few fine tubular pores; few thin clay films on faces of peds; 5 percent basalt gravel; neutral; clear smooth boundary.

B21t—9 to 16 inches; brown (10YR 4/3) clay, dark brown (7.5YR 4/2) moist; strong very fine subangular blocky structure; very hard dry, firm moist, sticky and very plastic wet; common fine roots; few very fine tubular pores; many moderately thick clay films on peds in pores; 10 percent basalt gravel; mildly alkaline; clear smooth boundary.

B22t—16 to 24 inches; brown (10YR 5/3) gravelly clay, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; very hard dry, firm moist, sticky and very plastic wet; few very fine roots; few very fine tubular pores; common thin clay films on peds; 30 percent fine basalt gravel; slightly calcareous, thin lime coating on pebbles; mildly alkaline; abrupt wavy boundary.

R—24 inches; basalt with a thin layer of lime immediately above.

Rock fragments are basalt and range in size from pebbles to stones. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 dry and 2 or 3 moist. It is loam, silt loam, or clay loam that is 5 to 15 percent rock fragments. The B2t horizon has value of 3 or 4 moist. It is clay or clay loam that is 10 to 30 percent rock fragments. The depth to bedrock is 20 to 40 inches.

TH—Thunderbird-Torreon association, undulating. This mapping unit is on basalt flows at elevations of 6,500 to 7,500 feet. It is about 55 percent a Thunderbird stony silt loam that has slopes of 1 to 9 percent, and about 30 percent a Torreon silt loam that has slopes of 0 to 5 percent. Thunderbird soils are on and near pressure ridges. Torreon soils are in the lower and flatter areas between the pressure ridges.

About 15 percent of this mapping unit is included areas of Apache, Ayon, and La Brier soils and basalt Rock outcrop. The Apache and Ayon soils and basalt Rock outcrop are on low ridges. The La Brier soils are in swales.

Thunderbird stony silt loam has the profile described as representative of the series. Runoff is slow to medium. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

Torreon silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is slow. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland. Thunderbird soil in Malpais range site. Torreon soil in Loamy range site.

Tinaja Series

The Tinaja series consists of deep, well drained soils on remnants of convex river terraces. These soils formed in alluvium derived from mixed sources. Slopes are 3 to 25 percent. Elevation is 5,800 to 7,000 feet. The vegetation is blue grama, sideoats grama, three-awn, and yucca. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is light brownish gray gravelly and very gravelly sandy clay loam about 12 inches thick. The subsoil is very pale brown very gravelly sandy clay loam about 13 inches thick. The substratum is pale brown very gravelly sandy clay loam and very gravelly loamy sand. The soil is mildly alkaline to moderately alkaline throughout.

The soil is moderately permeable. Available water capacity is 2 to 5 inches. Effective rooting depth is 60 inches or more.

Tinaja soils are used for range, wildlife habitat, as a source of gravel, and for watershed.

Representative profile of Tinaja gravelly sandy clay loam, 3 to 25 percent slopes, 1,320 feet east and 2,110 feet south of the northwest corner sec. 13, T. 27 N., R. 22 E.

A11—0 to 6 inches; light brownish gray (10YR 6/2) gravelly sandy clay loam, brown (10YR 4/3) moist; moderate very fine granular structure; soft dry, very friable moist, slightly sticky and slightly plastic wet; common fine and medium roots; many fine interstitial pores; 15 percent gravel; slightly calcareous; mildly alkaline; clear smooth boundary.

A12—6 to 12 inches; light brownish gray (10YR 6/2) very gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; moderate fine and very fine granular structure; hard dry, firm moist, slightly sticky and plastic wet; common fine and very fine roots; many fine interstitial pores; 50 percent fine gravel; slightly calcareous; mildly alkaline; gradual wavy boundary.

B2ca—12 to 25 inches; very pale brown (10YR

7/3) very gravelly sandy clay loam, light yellowish brown (10YR 6/4) moist; weak coarse subangular blocky structure; hard dry, firm moist, slightly sticky and plastic wet; few fine and very fine roots; common fine tubular pores; 40 percent gravel less than $\frac{3}{4}$ inch diameter, and 15 percent greater than $\frac{3}{4}$ inch diameter; moderately calcareous, lime accumulated on bottom of pebbles; moderately alkaline; gradual wavy boundary.

C1ca—25 to 41 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; massive; hard dry, firm moist, slightly sticky and plastic wet; few fine and very fine roots; many fine interstitial pores; 40 percent gravel less than $\frac{3}{4}$ inch diameter and 15 percent greater than $\frac{3}{4}$ inch diameter; strongly calcareous, lime accumulated on bottom of pebbles; moderately alkaline; clear wavy boundary.

IIC2—41 to 60 inches; pale brown (10YR 6/3) very gravelly loamy sand, yellowish brown (10YR 5/4) moist; single grained; loose dry and moist; few fine and very fine roots; many interstitial pores; 75 percent gravel, one-half is greater than $\frac{3}{4}$ inch diameter; slightly calcareous; mildly alkaline.

Rock fragments are of mixed origin and are mainly rounded pebbles, but rounded cobbles are in some areas. The A horizon has value of 5 or 6 dry and 3 through 5 moist and chroma of 2 through 4 dry or moist. It is sandy clay loam, loam, very fine sandy loam, or fine sandy loam that is 15 to 75 percent rock fragments. The B2ca horizon has value of 6 or 7 dry and 4 through 6 moist and chroma of 2 through 4 dry or moist. It is sandy clay loam or loam that is 35 to 75 percent rock fragments. The C1ca horizon has value of 6 through 8 dry and 4 through 6 moist. It has chroma of 2 through 4 dry or moist. It is sandy clay loam or loam that is 35 to 75 percent rock fragments. The IIC2 horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 6 through 8 dry and 5 through 7 moist, and chroma of 3 through 8 dry or moist. It is sand, loamy sand, or sandy loam that is 50 to 85 percent rock fragments.

TNE—Tinaja gravelly sandy clay loam, 3 to 25 percent slopes. This gently sloping to moderately steep soil is on old stream terraces at 5,800 to 7,000 feet elevation.

About 15 percent of this mapping unit is included areas of Colmor, Dalhart, Mion, Seelez, Swastika, and Texline soils. Mion soils are throughout the mapping unit. Colmor, Dalhart, Seelez, and Swastika soils are in narrow areas separating knolls of Tinaja soils. Texline soils are small caps on some knolls.

Tinaja gravelly sandy clay loam has the profile described as representative of the series. Runoff is slow. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This soil is used for range, wildlife habitat, and as a source of gravel. Capability subclass VIe dryland; Shallow range site.

Tolby Series

The Tolby series consists of deep, excessively drained soils on mountainsides. These soils formed in colluvium and alluvium derived from intrusive rocks. Slopes are 25 to 60 percent. Elevation is 9,000 to 12,000 feet. The vegetation is Engelmann spruce, subalpine fir, bristlecone pine, limber pine, and mountain grasses. Precipitation is 27 to 30 inches, the mean annual soil temperature is 34° to 40° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is a grayish brown stony loam about 11 inches thick. It is covered with about 3 inches of forest litter. The subsoil is pale brown and very gravelly loam about 11 inches thick. The substratum to a depth of 80 inches is pale brown gravelly loamy sand, yellowish brown cobbly loamy sand, pale brown very cobbly sandy loam, and pale brown very cobbly loamy sand. The soil ranges from extremely acid in the surface layer to medium acid in the lower part of the substratum.

The soil is rapidly permeable. Available water capacity is 4 or 5 inches. Effective rooting depth is about 60 inches or more.

Tolby soils are used for woodland, wildlife habitat, recreation, and watershed. They are mapped only with Angostura soils.

Representative profile of Tolby stony loam in an area of Angostura-Tolby association, steep, about 6.5 miles north-northeast of Eagle Nest, New Mexico, on the northeast wooded slope of Baldy Mountain near the source of South Ponil Creek:

O1—3 inches to 1 inch; forest litter.

O2—1 inch to 0; decayed forest litter.

A1—0 to 11 inches; grayish brown (10YR 5/2) stony loam, brown (10YR 4/3) moist; moderate medium and fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and coarse roots; many fine tubular pores; 40 percent angular gravel, cobbles, and stones; extremely acid; clear smooth boundary.

B2—11 to 22 inches; pale brown (10YR 6/3) very gravelly loam, dark yellowish brown (10YR 3/4) moist; common distinct mottles of reddish brown (5YR 4/3), dark reddish brown (5YR 3/3) moist on fragments; massive; soft dry, very friable moist; many fine, medium and coarse roots; many medium interstitial pores; 80 to 95 percent rock fragments; extremely acid; clear wavy boundary.

IIC1—22 to 30 inches; brown (10YR 5/3) gravelly loamy sand, dark yellowish brown (10YR 3/4) moist; common distinct mottles of reddish brown (5YR 4/3), dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine granular; soft dry, very friable moist; few fine roots; few fine tubular pores; 35 percent angular gravel and cobbles; very strongly acid; clear wavy boundary.

IIC2—30 to 44 inches; yellowish brown (10YR

5/4) cobbly loamy sand, dark brown (10YR 3/3) moist; common distinct mottles of reddish brown (5YR 4/3), dark reddish brown (5YR 3/3) moist; weak medium platy structure parting to moderate medium granular; soft dry, very friable moist; few fine roots; few very fine tubular pores; 45 percent angular gravel and cobbles; strongly acid; clear wavy boundary.

11C3—44 to 57 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; common distinct mottles of brown (7.5YR 5/4), dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft dry, very friable moist; few fine roots; few fine interstitial pores; 50 percent angular gravel and cobbles; strongly acid; clear wavy boundary.

IIC4—57 to 80 inches; pale brown (10YR 6/3) very cobbly loamy sand, dark yellowish brown (10YR 4/4) moist; many distinct mottles of very dark gray (7.5YR 3/1), black (7.5YR 2/1) moist; weak fine subangular blocky structure; soft dry, very friable moist; few fine roots; few fine tubular pores; 70 percent angular gravel and cobbles; medium acid.

Rock fragments are angular intrusive rocks and range in size from pebbles to stones. The O horizon is 1 to 26 inches thick. The A1 horizon has hue of 10YR or 7.5YR. It is loam or sandy loam that is 35 to 50 percent rock fragments. The B2 horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4 dry and moist. It is loam or sandy loam that is 30 to 95 percent rock fragments. The IIC horizons have hue of 10YR or 7.5YR. They are 30 to 75 percent rock fragments.

Torreon Series

The Torreon series consists of deep, well drained soils on broad fans. These soils formed in a mixture of residuum and alluvium derived from basalt. Slopes are 0 to 5 percent. Elevation is 6,000 to 7,500 feet. The vegetation is blue grama, western wheatgrass, buffalograss, fringed sagewort, and broom snakeweed. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown silt loam and silty clay loam about 11 inches thick. The subsoil is brown clay and pale brown silty clay and silty clay loam about 41 inches thick. The substratum is white clay loam. Soil reaction is neutral in the surface layer, mildly alkaline in the upper part of the subsoil, and moderately alkaline in the lower part of the subsoil and in the substratum.

The soil is slowly permeable. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more.

Torreon soils are used for range, wildlife habitat, watershed, and recreation.

Representative profile of Torreon silt loam in an area of Capulin-Torreon association, moderately sloping, 700 feet south and 2,100 feet west of the northeast corner sec. 25, T. 29 N., R. 24 E.

A1—0 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine granular structure, with weak thick platy structure in upper 2 inches; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

A3—6 to 11 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine subangular blocky; hard dry, firm moist, slightly sticky and plastic wet; many fine roots; common very fine tubular pores; neutral; clear smooth boundary.

B21t—11 to 21 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium angular and subangular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine roots; common very fine tubular pores; continuous thick clay films on peds and in pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B22tca—21 to 36 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; moderate fine angular and subangular blocky structure; very hard dry, firm moist, slightly sticky and very plastic wet; few fine roots; common very fine tubular pores; many thin clay films on peds and in pores; strongly calcareous; common fine and medium masses and threads of lime; moderately alkaline; clear smooth boundary.

B3ca—36 to 52 inches; pale brown (10YR 6/3) silty clay loam, yellowish brown (10YR 5/4) moist; weak fine prismatic structure; hard dry, friable moist, plastic wet; very few fine roots; common very fine tubular pores; 5 percent basalt pebbles; strongly calcareous; common fine masses and threads of lime; moderately alkaline; clear smooth boundary.

Cca—52 to 62 inches; white (10YR 8/2) clay loam, very pale brown (10YR 7/3) moist; massive; soft dry, friable moist, plastic wet; 10 percent basalt gravel, cobbles, and stones; strongly calcareous; moderately alkaline.

Rock fragments are basalt and range from a trace to 15 percent. The A1 horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, and chroma of 2 or 3. It is silt loam, loam, silty clay loam, or clay. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 or 5 moist, and chroma of 2 through 4. It is silty clay, clay, clay loam, or silty clay loam. The Cca horizon has hue of 10YR or 7.5YR and value of 6 through 8 dry and 5

through 7 moist. It is clay loam, silty clay loam, or silt loam.

TO—Torreon-Deacon association, sloping. This mapping unit is on uplands at elevations of 6,000 to 7,500 feet. It is about 55 percent a Torreon silt loam that has slopes of 1 to 5 percent and about 30 percent a Deacon loam that has slopes of 1 to 7 percent. Torreon silt loam is on flat or slightly concave fans. Deacon loam is on convex fans at the higher parts of the landscape.

About 15 percent of this mapping unit is included areas of Capulin, Colmor, Oro Grande, La Brier, and Manzano soils. Capulin and Colmor soils are on fans. The Oro Grande soil is on small ridges near the higher parts of the landscape. La Brier and Manzano soils are in swales.

Torreon silt loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Deacon loam has a profile similar to the one described as representative of the series, but it has a thinner surface layer and subsoil. Runoff is medium to rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, and watershed. Capability subclass VIe dryland; Loamy range site.

Travessilla Series

The Travessilla series consists of shallow and very shallow, well drained soils on ridges and benches. These soils formed in residuum derived from sandstone. Slopes are 3 to 30 percent. Elevation is 5,500 to 6,800 feet. The vegetation is blue grama, sideoats grama, little bluestem, big bluestem, pinyon pine, and one-seed juniper. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 55° F, and the frost-free season is 130 to 180 days.

In a representative profile, the surface layer is brown fine sandy loam about 3 inches thick. The substratum is brown loam about 8 inches thick. The depth to sandstone is 11 inches. Soil reaction is mildly alkaline.

The soil is moderately rapidly permeable. Available water capacity is 1 or 2 inches. Effective rooting depth is 6 to 20 inches.

Travessilla soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Travessilla fine sandy loam in an area of Travessilla-Bernal-Rock outcrop association, 1,925 feet east and 1,560 feet north of the southwest corner of sec. 33, T. 26 N., R. 27 E.

A1—0 to 3 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist, weak medium platy structure; soft dry, very friable moist; many fine and very fine roots; many very fine interstitial pores; slightly calcareous; mildly alkaline; clear smooth boundary.

C—3 to 11 inches; brown (10YR 5/3) light loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; common fine and very fine roots; many very fine tubular pores; strongly calcareous; mildly alkaline; abrupt wavy boundary.

R—11 inches; hard sandstone with some fractures.

Rock fragments consist of sandstone stones, cobbles, and gravel and are from 0 to 25 percent of the A horizon and from 0 to 30 percent of the C horizon. The A and C horizons have hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 through 5 moist, and chroma of 2 through 4. They are fine sandy loam or loam. The soil is noncalcareous to calcareous. The depth to sandstone bedrock is 6 to 20 inches.

Tr—Travessilla-Rock outcrop complex. This mapping unit is on sandstone escarpments and breaks at elevations of 5,500 to 6,800 feet. It is about 55 percent a Travessilla stony loam that has slopes of 15 to 30 percent intermingled with 35 percent Rock outcrop. The Travessilla soils are on sandstone benches. Rock outcrop occurs throughout the mapping unit.

About 10 percent of this mapping unit is included areas of Litle, Colmor, and Bernal soils and Rubble land. These soils are in small, deep pockets throughout the mapping unit. Rubble land is on steep slopes below Rock outcrop that is mostly sandstone.

Travessilla stony loam has a profile similar to the one described as representative of the series, but it has a stony loam surface layer. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

This mapping unit is used for range, wildlife habitat, and recreation. Capability subclass VIIs dryland. Travessilla soil in Shallow Sandstone range site.

TS—Travessilla-Bernal-Rock outcrop association. This mapping unit is on breaks and narrow mesas or broad ridges at elevations of 5,600 to 6,500 feet. Slopes are 1 to 30 percent. This unit is about 40 percent a Travessilla fine sandy loam that has slopes of 3 to 30 percent, 30 percent a Bernal loam that has slopes of 1 to 9 percent, and 20 percent Rock outcrop. The Travessilla soil is in areas between, above, and below Rock outcrop. The Bernal soil is on the ridgetops and narrow mesas. Rock outcrop and sandstone occur throughout the mapping unit.

About 10 percent of this mapping unit is included areas of Carnero, Colmor, Partri, and Plack soils. The Carnero, Colmor, and Partri soils occur throughout the mapping unit. Plack soils are adjacent to drainageways.

Travessilla fine sandy loam has the profile described as representative of the series. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Bernal loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, and watershed. Travessilla soil in capability subclass VIIs dryland, Shallow Sandstone range site. Bernal soil in capability subclass VIs dryland, Shallow range site. Rock outcrop in capability subclass VIIIs dryland.

Tricon Series

The Tricon series consists of moderately deep, well drained soils on uplands. These soils formed in fine textured material of mixed composition. Slopes are 0 to 5 percent. Elevation is 6,000 to 7,000 feet. The vegetation is blue grama, galleta, and buffalograss. Precipitation is 15 to 18 inches, the mean annual soil temperature is 47° to 53° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is brown silt loam about 4 inches thick. The subsoil is dark grayish brown, yellowish brown, and light brown silty clay loam and clay loam about 19 inches thick. Indurated caliche is at a depth of 23 inches. Soil reaction is mildly alkaline in the surface layer and neutral to mildly alkaline in the subsoil.

The soil is slowly permeable. Available water capacity is 3 to 5 inches. Effective rooting depth is 20 to 40 inches.

Tricon soils are used for range, wildlife habitat, and watershed.

Representative profile of Tricon silt loam in an area of Tricon-Plack association, gently sloping, 30 feet east and 1,420 feet north of the southwest corner sec. 21, T. 26 N., R. 26 E.

A1—0 to 4 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard dry, friable moist, slightly sticky and plastic wet; common fine roots; common very fine interstitial pores; mildly alkaline; clear smooth boundary.

B21t—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard dry, friable moist, slightly sticky and plastic wet; many fine and very fine roots; few fine tubular pores; few thin clay films in pores and on peds; neutral; clear wavy boundary.

B22t—9 to 17 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; very hard dry, firm moist, sticky and plastic wet; common fine roots; common fine tubular pores; continuous thin clay films in pores and on peds; neutral; clear wavy boundary.

B23tca—17 to 23 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; very hard dry, friable moist, sticky and plastic wet; few fine roots; few fine tubular pores; common thin clay films on peds; slightly calcareous; mildly alkaline; abrupt wavy boundary.

Ccam—23 to 27 inches; pinkish white (7.5YR 8/2) indurated caliche that grades to weakly cemented with depth.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. It is loam or silt loam. The B2t horizon has value of 4 to 6 dry and 3 or 4 moist and chroma of 2 or 4. It is clay loam, silty clay loam, or clay. The depth to calcareous soil is 8 to 20 inches. The depth to indurated caliche is 20 to 40 inches.

TX—Tricon-Plack association, gently sloping. This nearly level to moderately sloping mapping unit is on upland plains at elevations of 6,000 to 7,000 feet. It it about 45 percent a Tricon silt loam that has slopes of 0 to 5 percent and about 40 percent a Plack loam that has slopes of 0 to 5 percent.

About 15 percent of this mapping unit is included areas of Apache, Ayon, Capulin, and Deacon soils. Apache and Ayon soils are in small, stony areas. Capulin and Deacon soils are on smooth slopes along the edges of the mapping unit.

Tricon silt loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

Plack loam has the profile described as representative of the series. Runoff is medium. The hazards of water erosion and soil blowing are moderate.

This mapping unit is used for range, wildlife habitat, recreation, and watershed. Tricon silt loam in capability subclass VIe dryland, Loamy range site. Plack loam in capability subclass VIIs dryland, Shallow range site.

Ustochrepts

The Ustochrepts are a group of closely related, well drained soils on mountainsides. These soils formed in colluvium and alluvium derived from intrusive acid igneous rock. Slopes are 50 to 70 percent. Elevation is 7,500 to 12,000 feet. The vegetation is scattered pinyon pine, one-seed juniper, Gambel oak, mountainmahogany, Arizona fescue, sideoats grama, and blue grama. Precipitation is 18 to 27 inches, the mean annual soil temperature is 39° to 45° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is brown cobbly loam about 8 inches thick. The subsoil is brown and light brown very gravelly loam, sandy clay loam, and very stony clay loam about 38 inches thick. The depth to acid igneous intrusive bedrock is 43 inches. Soil reaction is neutral and mildly akaline.

The depth to bedrock is 10 inches to 60 inches or more. Ustochrepts are from 20 to 90 percent rock fragments. The fragments increase in size and amount with depth.

Ustochrepts are used for wildlife habitat, recreation, and watershed.

US—Ustochrepts-Rock outcrop complex. This mapping unit is on mountainsides at elevations of 7,500 to 12,000 feet (fig. 6). Slopes are 50 to 75 percent. This unit is about 45 percent Ustochrepts that have slopes of 50 to 70 percent intermingled with 40 percent Rock outcrop.

About 15 percent of this mapping unit is included areas of Rubble land and Bundo, Cypher, and Abreu soils. Rubble land is below Rock outcrop. Bundo, Cypher, and Abreu soils are at the upper limits of the complex.

Ustochrepts have rapid runoff. The hazard of water erosion is high, and the hazard of soil blowing is slight. Rock outcrop is acid igneous intrusive rock.

This mapping unit is used for range, wildlife habitat, recreation, watershed, and woodland. Capability subclass VIIe dryland. Ustochrepts in Mountain Shale range site.

Vamer Series

The Vamer series consists of very shallow to shallow, well drained soils on ridges, foothills, and mesas. These soils formed in fine textured residuum derived from interbedded sandstone and shale. Slopes are 1 to 15 percent. Elevation is 7,000 to 9,000 feet. The vegetation is little bluestem, pine dropseed, mountain muhly, Arizona fescue, pinyon pine, Rocky Mountain juniper, and scattered ponderosa pine. Precipita-

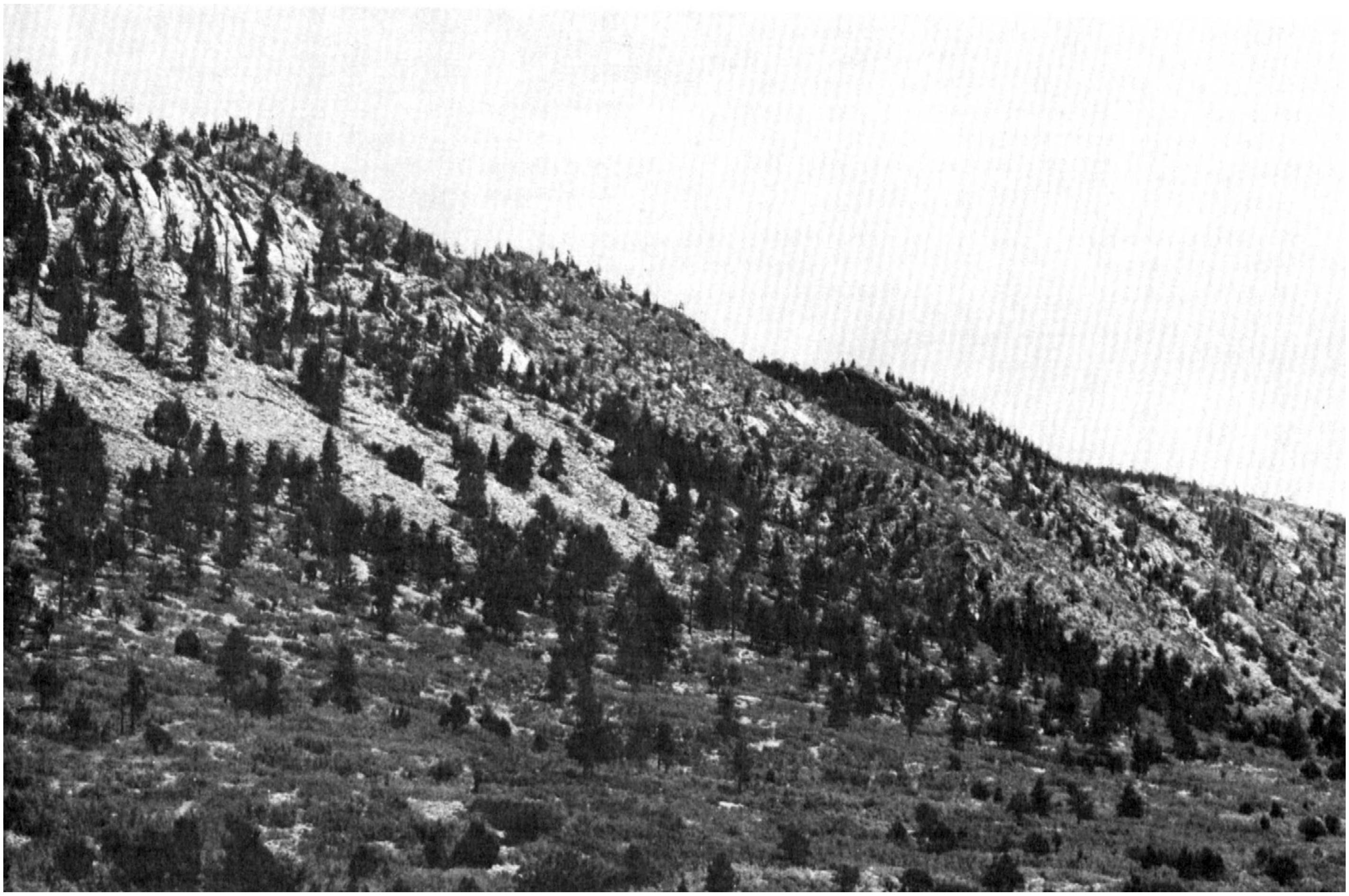


Figure 6.—Area of Ustochrepts-Rock outcrop complex.

tion is 16 to 19 inches, the mean annual soil temperature is 44° to 46° F, and the frost-free season is 90 to 110 days.

In a representative profile, the surface layer is grayish brown stony very fine sandy loam about 4 inches thick. The subsoil is brown clay about 12 inches thick. The depth to sandstone is 16 inches. Soil reaction is neutral.

The soil is slowly permeable. Available water capacity is 2 or 3 inches. Effective rooting depth is 7 to 20 inches. Vamer soils are used for range, wildlife habitat, recreation, and watershed. They are mapped only with Dargol, Fuera, Ponil, and Stout soils.

Representative profile of Vamer stony very fine sandy loam in an area of Dargol-Stout-Vamer association, sloping, approximately 8.5 miles north northwest along Van Bremmer Canyon Road from the junction with U.S. Highway 64; on mesa top, 1,050 feet east and 880 feet north of the junction of Trail Canyon and Van Bremmer Canyon:

A1—0 to 4 inches; grayish brown (10YR 5/2) stony very fine sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft dry, very friable moist, slightly sticky wet; many fine and very fine roots; many fine interstitial pores; 15 percent angular cobbles and stones; neutral; clear smooth boundary.

B21t—4 to 10 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; strong fine and very fine angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; common fine and very fine roots; common fine interstitial and few fine tubular pores; many thick clay films on peds; neutral; clear smooth boundary.

B22t—10 to 16 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; common medium faint mottles of yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure parting to moderate medium angular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine and very fine roots; few very fine tubular pores; many thick clay films on peds; neutral; abrupt smooth boundary.

R—16 inches; hard sandstone.

Rock fragments are angular sandstone and range in size from gravel to stones. The A horizon has hue of 10YR and 7.5YR, value of 4 or 5 dry and 2 through 4 moist, and chroma of 2 or 3 dry and moist. It is very fine sandy loam, fine sandy loam, or loam that is 5 to 25 percent rock fragments. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4 dry and moist. It is clay, silty clay, silty clay loam, or clay loam that is 0 to 15 percent rock fragments. The depth to bedrock ranges from 7 to 20 inches.

Vermejo Series

The Vermejo series consists of deep, moderately well drained soils in broad drainageways, in swales, and on alluvial fans. These soils formed in alluvium derived from shale. Slopes are 0 to 3 percent. Elevation is 5,800 to 7,500 feet. The vegetation on the nonsaline soils is buffalograss, western wheatgrass, galleta, blue grama, and four-wing saltbush. On the saline soils, it is alkali sacaton and inland saltgrass. Precipitation is 14 to 17 inches, the mean annual soil temperature is 47° to 55° F, and the frost-free season is 130 to 160 days.

In a representative profile, the surface layer is grayish brown silty clay loam about 2 inches thick. The next layer is grayish brown silty clay about 16 inches thick. It is underlain by grayish brown silty clay that contains mycelia and crystals of salt. The soil is moderately to strongly alkaline throughout.

The soil is very slowly permeable. Available water capacity is 9 or 10 inches. Effective rooting depth is 60 inches or more.

These soils are used for range, irrigated cropland, wildlife habitat, and watershed.

Representative profile of Vermejo silty clay loam about 5 miles west and 3/4 mile north of French Corners of the center of the NE1/4 sec. 27, T. 26 N., R. 21 E.

A1—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; strong very fine granular structure; the surface 1/2 inch has moderate thin platy structure; soft dry, firm moist, sticky and very plastic wet; common fine and very fine roots; few fine tubular and few fine vesicular pores; moderately calcareous; moderately alkaline; abrupt smooth boundary.

AC—2 to 18 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; very hard dry, extremely firm moist, sticky and very plastic wet; few fine and very fine roots; few fine tubular pores; few pressure faces and slickensides; moderately calcareous; strongly alkaline; abrupt wavy boundary.

C1cs—18 to 37 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; very hard dry, very firm moist, sticky and very plastic wet; very few fine roots; very fine tubular pores; few pressure faces and slickensides; common mycelia and crystals of salt; moderately calcareous; moderately alkaline; clear wavy boundary.

C2cs—37 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard dry, very firm moist, sticky and very plastic wet; few fine vesicular pores; common mycelia and crystals of salt; moderately calcareous; moderately alkaline.

The A1 horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 through 4. It is silty clay loam, clay, or silty clay. The AC horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 through 4. It is silty clay, clay, or silty clay loam. The Ccs horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 through 4. It is silty clay, clay, or silty clay loam.

Ve—Vermejo silty clay loam. This level to nearly level soil is on alluvial fans at elevations of 6,000 to 7,500 feet. Slopes are 0 to 2 percent.

About 15 percent of this mapping unit is included areas of Mion and Litle soils and saline Vermejo soils. Litle and Mion soils are on low ridges. The saline Vermejo soils are in low areas.

Vermejo silty clay loam has the profile described as representative of the series. Runoff is medium. Water erosion is a high hazard. The hazard of soil blowing is moderate. Flooding is rare.

This soil is used for range, wildlife habitat, irrigated cropland, and watershed. Capability unit IVs–9 irrigated, subclass VIs dryland; Clayey range site.

Vm—Vermejo silty clay loam, saline. This level to nearly level soil is in swales at elevations of 6,000 to 7,500 feet. Slopes are 0 to 2 percent. Salt crystals are visible within a depth of 18 inches.

About 10 percent of this mapping unit is included areas of Mion and Litle soils and other Vermejo soils. These soils are in slightly elevated areas. Gully erosion is severe in some small areas.

Vermejo silty clay loam, saline, has a profile similar to the one described as representative of the series, but it has concentrations of soluble salts in the surface layer. Available water capacity is 5 to 7 inches. Runoff is slow. The hazard of water erosion is high, and the hazard of soil blowing is moderate. Flooding is rare.

This soil is used for range, wildlife habitat, irrigated cropland, and watershed. Capability unit IVs–9 irrigated, subclass VIs dryland; Salt Flats range site.

Vs2—Vermejo and Swastika soils, eroded. This mapping unit is on alluvial fans at elevations of 6,000 to 7,000 feet. It is about 65 percent a Vermejo silty clay loam that is eroded and has slopes of 0 to 3 percent and about 20 percent a Swastika silty clay loam that has slopes of 2 to 5 percent. Vermejo silty clay loam is on fans and valley fills adjacent to deeply cut drainage channels. Areas are more than 50 percent gullies up to 6 feet deep. Swastika silty clay loam is on uplands. Sheet and gully erosion are severe.

About 15 percent of the mapping unit is included areas of Mion, Litle, and La Brier soils. Mion and Litle soils are in delineations of Vermejo silty clay loam and are eroded in the same manner. La Brier

soils are in delineations of Swastika silty clay loam and are eroded in a similar manner. Deep central gullies are in some La Brier soils.

Vermejo silty clay loam, eroded, has a profile similar to the one described as representative of the series, but the entire surface layer has been removed (fig. 7) through erosion. Runoff is medium. The hazard of water erosion is high, and the hazard of soil blowing is moderate.

Swastika silty clay loam, eroded, has a profile similar to the one described as representative of the series, but part or all of the surface layer has been removed through soil blowing (fig. 8). Runoff is medium. The hazards of water erosion and soil blowing are high. Flooding is rare.

These soils are used for range, wildlife habitat, and watershed. Vermejo soil in capability subclass VIe dryland; Clayey range site. Swastika soil in dryland capability subclass VIe; Clayey range site.

Wellsville Series

The Wellsville series consists of deep, steep, well drained soils on mountainsides. These soils formed in alluvium, colluvium, and residuum derived from mixed and intrusive rocks. Slopes are 10 to 50 percent. Elevation is 9,500 to 10,500 feet. The vegetation is Arizona fescue, mountain muhly, prairie junegrass, pussytoes, fringed sagewort, and locoweed. Precipitation is 18 to 22 inches, the mean annual soil temperature is 40° to 45° F, and the frost-free season is less than 90 days.

In a representative profile, the surface layer is very dark grayish brown cobbly loam about 10 inches thick. The subsoil is brown cobbly clay loam, sandy clay loam, and light yellowish brown clay loam about 22 inches thick. The substratum is light gray clay loam and pale brown cobbly sandy clay loam. Soil reaction is slightly acid in the surface layer, slightly acid to mildly alkaline in the subsoil, and moderately alkaline in the substratum.

The soil is moderately slowly permeable. Available water capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more.

Wellsville soils are used for range, wildlife habitat, recreation, and watershed.

Representative profile of Wellsville cobbly loam, 10 to 50 percent slopes, about 13 miles west-northwest of Vermejo Park Headquarters or 1,650 feet west and 1,410 feet north of the western end of the dam on the northernmost Underwood Lake:

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; moderate very fine granular structure; soft dry, very friable moist, slightly plastic wet; many fine and very

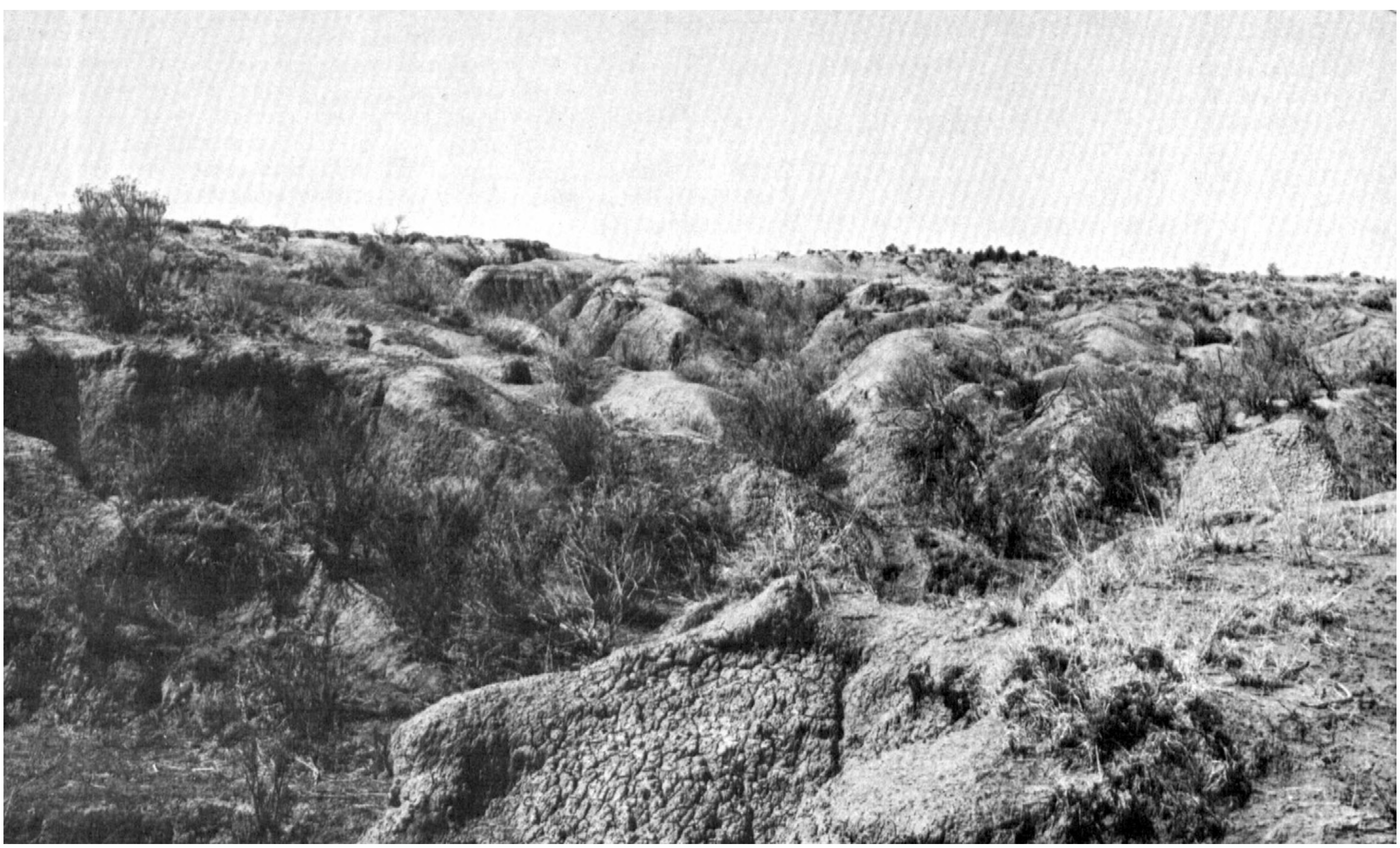


Figure 7.—Water erosion on Vermejo silty clay loam in area of Vermejo and Swastika soils, eroded.

Figure 8.—**Soil blowing on Swastika silty clay loam in area of Vermejo and Swastika soils, eroded.**

fine roots; many very fine interstitial pores; 15 percent cobbles; slightly acid; clear wavy boundary.

B1—10 to 15 inches; brown (7.5YR 4/2) cobbly clay loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and plastic wet; common fine and very fine roots; common very fine tubular pores; 20 percent gravel and cobbles; slightly acid; clear smooth boundary.

B21t—15 to 22 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; hard dry, firm moist, slightly sticky and very plastic wet; few fine and very fine roots; common very fine tubular pores; many thick clay films on peds; 15 percent gravel; neutral; clear wavy boundary.

B22t—22 to 32 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; strong coarse prismatic structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine and very fine roots; few very fine tubular pores; many thick clay films on peds; mildly alkaline; gradual smooth boundary.

C1ca—32 to 49 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; moderate coarse prismatic structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few very fine roots; few very fine tubular pores; many thick clay films on peds; strongly calcareous; common medium masses and threads of lime; moderately alkaline; gradual wavy boundary.

C2—49 to 63 inches; pale brown (10YR 6/3) cobbly sandy clay loam, brown (10YR 5/3) moist; massive; hard dry, firm moist, slightly sticky and plastic wet; very few very fine roots; very few very fine tubular pores; 20 percent gravel, cobbles, and stones; strongly calcareous; moderately alkaline.

Rock fragments are of mixed origin and range

from gravel to cobbles and stones. They are 5 to 30 percent of the A horizon, a trace to 25 percent of the B2t horizon, and a trace to 25 percent of the C horizon. The A horizon has value of 3 to 4 dry and 2 or 3 moist and chroma of 1 or 2. It is loam or silt loam. The B2t horizon has hue of 7.5YR to 10YR, value of 3 through 5 dry and 3 or 4 moist, and chroma of 2 through 4. The C horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 6 or 7 dry and 5 or 6 moist, and chroma of 2 through 4. It is sandy clay loam, loam, or clay loam.

In mapping unit RE, the Wellsville soil has a cobbly clay loam B2t horizon, a cobbly sandy clay loam C horizon, and a warmer average summer soil temperature than that defined for the series. These differences, however, do not greatly affect use and management of these soils.

WEG—Wellsville cobbly loam, 10 to 50 percent slopes. This strongly sloping to steep soil is on mountainsides at elevations of 9,500 to 10,500 feet.

About 20 percent of this mapping unit is included areas of Rock outcrop, Rubble land, and Saladon, Hillery, and Angostura soils. Rock outcrop is throughout the mapping unit. Rubble land is on the steeper slopes. Saladon soils are in swales and on flats. The Hillery soils are on smoother positions. The Angostura soils are on the higher positions and are commonly wooded.

Wellsville cobbly loam has the profile described as representative of the series. Runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is slight.

This mapping unit is used for summer range, wildlife habitat, recreation, and watershed. Capability subclass VIIe dryland; Subalpine Grassland range site.

Yankee Series

The Yankee series consists of deep, well drained soils on basalt-capped mesas and basalt flows. These soils formed in alluvium derived from basalt and other volcanic debris modified by eolian deposits. Slopes are 0 to 9 percent. Elevation is 7,500 to 8,700 feet. The vegetation is Arizona fescue, blue grama, and western wheatgrass. Precipitation is 15 to 20 inches, the mean annual soil temperature is about 42° to 47° F, and the frost-free season is from 90 to 110 days.

In a representative profile, the surface layer is dark grayish brown silt loam and silty clay loam about 9 inches thick. The subsoil is brown clay and silty clay about 40 inches thick. The substratum is brown silty clay. Soil reaction is neutral in the upper 2 feet and mildly alkaline to moderately alkaline and calcareous below 2 feet.

The soil is slowly permeable. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more.

Yankee soils are used for range, dryland crops, recreation, wildlife habitat, and watershed. They are mapped only with Barela soils.

Representative profile of Yankee silt loam in an area of Barela-Yankee association, 340 feet west and 5 feet north of the southeast corner sec. 22, T. 31 N., R. 26 E.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; many fine and very fine roots; common fine interstitial pores; neutral; abrupt smooth boundary.

A12—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; hard dry, firm moist, slightly sticky and plastic wet; many fine and very fine roots; few fine tubular and few fine interstitial pores; neutral; abrupt smooth boundary.

B21t—9 to 14 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to moderate coarse angular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine roots; few fine tubular pores; common cracks; many thick clay films on peds; neutral; clear smooth boundary.

B22t—14 to 27 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine roots; few very fine tubular pores; many thick clay films on peds; common cracks; common pressure faces; 5 percent rounded basalt gravel; neutral; gradual smooth boundary.

B23tca—27 to 49 inches; brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky structure; very hard dry, very firm moist, slightly sticky and very plastic wet; few very fine roots; very few fine tubular pores; few thin clay films on peds; common pressure faces; slightly calcareous; few fine rounded soft masses of segregated lime; mildly alkaline; gradual smooth boundary.

C—49 to 60 inches; brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/4) moist; many fine faint strong brown (7.5YR 5/6) mottles; massive; very hard dry, very firm moist, slightly sticky and very plastic wet; few fine and medium tubular pores; many pressure faces; mildly alkaline.

Rock fragments are rounded basalt pebbles and are less than 5 percent of the pedon. The A horizon has value of 3 or 4 dry and 2 or 3 moist and chroma of 1 or 2 dry and moist. It is silt loam, silty clay loam, or loam. The B2t horizon has hue of 10YR to 2.5YR and value of 3 through 5 dry and 2 to 4 moist. It is clay or silty clay. The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 6 dry and 3 through 5 moist, and chroma of 2 through 6 dry and moist.

Use and Management of the Soils

This section describes the use and management of the soils of Colfax County. It includes an explanation of capability classification and describes the management of irrigated and dryland crops in the capability units. It also describes range management in the range sites and woodland management in the woodland suitability groups. Estimated yields are given. The management of soils for recreation, wildlife habitat, and engineering is also described.

Range[3]

Range is the most important land use in Colfax County, utilizing 68 percent of the area. An appreciable amount of grazeable woodland is also used seasonally. Most of the range on the east side of the county is used all year for cow-calf-yearling operations. Most of the range on the west and north side is used seasonally, generally in summer, either by cows, calves, or yearlings. Livestock operations vary considerably in size from small, submarginal units of a few hundred acres to extremely large, economical units of several thousand acres.

The east side of the area is suited to year-round grazing except in years with a very severe winter. The western and northern areas are mainly suited to summer use. Most ranchers use supplemental feed in winter and in years of below normal precipitation.

Soils that have the capacity to produce the same kinds, amounts, and proportions of range plants are grouped into range sites. A range site is the product of all the environmental factors responsible for its development, including soils, climate, and vegetation.

A plant community found on a range site in the absence of abnormal grazing use or other disturbance and significant physical site deterioration is the natural potential or climax plant community for that site. Climax plant communities do not have precise or fixed compositions but vary, within reasonable limits, from year to year and from place to place.

Abnormal disturbances, such as overuse by livestock, excessive burning, or plowing, change the climax plant community or even completly destroy it if the disturbance is drastic. If the range site does not deteriorate significantly from soil blowing or water erosion, secondary plant succession progresses in the direction of the natural potential or the climax plant community for the site.

Range conservationists and soil scientists work together to determine the natural potential plant communities for individual soil units and to group soils into range sites.

Range condition is the present state of the vegetation or plant community on a range site as related to the climax plant community for the site. The primary purpose of determining range condition is to provide an index of the changes that have taken place in the plant cover. When the potential plant community for a site is known, the present condition can be determined, thereby providing a basis for predicting the nature and direction of plant community changes to be expected from management practices.

When changes occur in the climax plant community because of particular kinds of use or disturbance, some plant species will increase and others will decrease. How a plant reacts to grazing depends on the kinds of grazing animals, the season of use, and the degree to which plant tissue is removed. By comparing the composition of the present condition to the climax plant community, it is possible to see how individual species have increased while others have decreased. Plants not present in the climax community, which show up in the present condition, are considered invaders for the site.

The composition of plant communities, in both climax and present condition, together with other range site information provides the interpretative basis for selecting management objectives, designing grazing systems, managing wildlife, determining recreation potentials, and evaluating hydrologic conditions.

Management objectives on rangeland usually relate to increasing desirable plants and restoring rangeland to as near climax condition as possible. Sometimes management objectives may create or maintain plant communities somewhat removed from the climax to fit specific needs in a grazing program and to provide for wildlife habitat, or for other benefits. Any management objective must be compatible with conservation objectives, providing for plant communities that will protect and improve soil and water resources and meet the desires and needs of the operator.

Descriptions of range sites

In the following pages, the range sites of Colfax County are described and the climax plants and principal invaders are named. An estimate of the total production of air dry vegetation for each site is also given. To find the range site for any mapping unit, refer to the "Guide to Mapping Units" at the back of this survey.

BREAKS RANGE SITE

The soils in this range site are very shallow to deep. They are 0 to 50 percent rock fragments from the surface on downward. Rubble land and Rock outcrop are common. Slopes range from 3 to 75 percent but are mostly 20 to 50 percent. Annual precipitation is 14 to 19 inches. The elevation is 6,000 to 8,200 feet.

The soils are well drained. Runoff is rapid. The erosion hazard is moderate. The hazard of soil blowing is slight. Permeability is moderate to very slow. Available water capacity is 1 to 9 inches.

The approximate species composition of the potential plant community is highly variable depending on the exposure, the percent slope, the elevation, the number of rock fragments and stones, and the kind of bedrock. The major species in the plant community are as follows:

	Percent composition by weight
Mountain muhly	15
Little bluestem	15
Sideoats grama	15
Blue and hairy grama	10

[3] HENRY E. WALL, JR., range conservationist, Soil Conservation Service, helped prepare this section.

Western wheatgrass	10
Galleta	5
Needleandthread	5
Skunkbush sumac	5
Pinyon pine	10
One-seed juniper	5
Gambel oak	5

Other species are Arizona fescue, sedges, perennial forbs, big bluestem, bluegrass, prairie junegrass, mountainmahogany, three-awn, fringed sagewort, lupine, locust, pine dropseed, ponderosa pine, and annual forbs. Under continued heavy grazing, the little bluestem, mountain muhly, sideoats grama, and needleandthread are replaced by an increase of blue grama, hairy grama, Gambel oak, and perennial forbs. Kentucky bluegrass, rubber rabbitbrush, and sleepygrass will invade this community.

This plant community offers livestock protection during winter storms. Trails for livestock and access roads are generally needed to obtain better distribution.

The total production of all vegetation of this plant community is estimated to be 1,500 pounds, air dry, per acre, in years of favorable growing conditions and 600 pounds in unfavorable years. Approximately 60 percent of this total is from plants that furnish forage for cattle.

CINDER RANGE SITE

The soils in this range site are deep. They have a gravelly loam surface layer that is underlain by cinders at 12 to 30 inches. Slopes range from 25 to 50 percent. Elevation is 7,000 to 9,000 feet. Annual precipitation is 15 to 20 inches.

The soils are somewhat excessively drained. Runoff is slow. Permeability is moderate. Available water capacity is 3 to 6 inches. The erosion hazard is moderate. The hazard of soil blowing is slight.

The approximate series composition of the potential plant community is as follows:

	Percent composition by weight
Prairie junegrass	5
Little bluestem	25
Sideoats grama	25
Big bluestem	5
Blue grama	5
Pinyon pine	20
One-seed juniper	10
Gambel oak	5

Other species are galleta, wolftail, yucca, Apacheplume, mountainmahogany, and skunkbush sumac. Under continued heavy grazing, the little bluestem, sideoats grama, and prairie junegrass are replaced by blue grama, one-seed juniper, pinyon pine, Gambel oak, and skunkbush sumac. Ring muhly and sleepygrass invade this site.

The total annual production of all vegetation is estimated to be 1,300 pounds, air dry, per acre, in years of favorable growing conditions and 700 pounds in unfavorable years. Approximately 70 percent of this total is from plants that furnish forage for cattle.

CLAYEY RANGE SITE

The soils in this site are moderately deep and deep. They have a clay loam, silty clay loam, or silty clay surface layer. Slopes are 0 to 5 percent. Elevation is 5,800 to 7,500 feet. Annual precipitation is 14 to 17 inches.

These soils are well drained to moderately well drained, have medium to rapid runoff, and have moderately slow to very slow permeability. Available water capacity is 3 to 13 inches. The hazards of soil erosion and soil blowing are moderate or high.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Western wheatgrass	15
Sideoats grama	10
Vine-mesquite	5
Alkali sacaton	25
Spike muhly	5
Blue grama	20
Galleta	15
Four-wing saltbush	5

Other species are pricklypear, Wright eriogonum, bottlebrush squirreltail, and broom snakeweed. Gumweed, western ragweed, tumbleweed, and tumblegrass invade this site.

Under continued heavy grazing, the western wheatgrass, sideoats grama, and spike muhly are replaced by blue grama and perennial forbs. The soils in this site are suitable for contour furrowing, ripping, pitting, and revegetation.

The total annual production of all vegetation of this site is estimated to be 1,800 pounds, air dry, per acre, in years of favorable growing season conditions and 600 pounds in unfavorable years. Approximately 90 percent of this total is from plants that furnish forage for cattle.

DEEP SAND RANGE SITE

The soils in this site are deep. They have a loamy fine sand surface layer. The soils are well drained, have slow runoff, and have moderate permeability. Available water capacity is 7 to 10 inches. Slopes are 0 to 5 percent. The erosion hazard is slight, and the hazard of soil blowing is high. Elevation is 6,000 to 6,500 feet. Annual precipitation is 15 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	25
Sideoats grama	20
New Mexico feathergrass	5
Needleandthread	5
Sand bluestem	10
Sand dropseed	10
Sand sagebrush	5
Silver bluestem	5
Blue and hairy grama	15

Other species are yucca, three-awn, black grama, red lovegrass, sand muhly, spike dropseed, perennial forbs, and annual forbs. Under continued heavy grazing, the little bluestem, sideoats grama, needleandthread, and New Mexico feathergrass are replaced by blue grama,

hairy grama, and perennial forbs. Woody plants may invade this site.

Soils in this site are suited to seeding and brush management, but special considerations must be given to controlling soil blowing.

The total annual production of all vegetation of this site is estimated to be 1,900 pounds, air dry, per acre, in years of favorable growing conditions and 1,000 pounds in unfavorable years. Approximately 90 percent of this total is from plants that furnish forage for cattle.

HILLS RANGE SITE

The soils in this site are very shallow to moderately deep. They have a gravelly loam, channery loam, or stony sandy clay loam surface layer. These soils are well drained, have medium to rapid runoff, and have moderate to slow permeability. Available water capacity is 1 to 5 inches. Slopes range from 3 to 35 percent, but most are 3 to 15 percent. The erosion hazard is moderate or high, and the hazard of soil blowing is slight or moderate. Elevation is 6,400 to 8,500 feet. Annual precipitation is 14 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	20
Sideoats grama	20
Western wheatgrass	5
Pinyon ricegrass	5
Bluegrass species	5
Blue and hairy grama	15
Galleta	5
Plains lovegrass	5
Pinyon pine	5
One-seed juniper	10
Gambel oak	5

Other species are three-awn, dropseed, wolftail, needleandthread, black grama, sedges, skunkbush sumac, mountainmahogany, cliffrose, and various perennial forbs. Under continued heavy grazing, the little bluestem, sideoats grama, and bluegrass are replaced by pinyon pine, one-seed juniper, Gambel oak, and blue grama. Sleepygrass and sweetclover will also invade this site.

The total annual production of all vegetation is estimated to be 1,200 pounds, air dry, per acre, in years with favorable growing conditions and 800 pounds in unfavorable years. Approximately 70 percent of this total is from plants that furnish forage for cattle.

LOAMY RANGE SITE

The soils in this site are moderately deep and deep. They have a silt loam and loam surface layer. Slopes are 0 to 9 percent. These soils are well drained. They have rapid to slow runoff and moderate to very slow permeability. The available water capacity is 3 to 13 inches. The soil erosion hazard is slight to high, and the hazard of soil blowing is moderate. Elevation is 5,800 to 7,600 feet. Annual precipitation is 14 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Blue grama	40
Western wheatgrass	15
Sideoats grama	10
Galleta	10
Sand dropseed	5
Wolftail	5
Bottlebrush squirreltail	5
Three-awn	5
Perennial forbs	5

Other species are ring muhly, mat muhly, buffalograss, broom snakeweed, gumweed, vine-mesquite, and annual forbs. Under continued heavy grazing, the western wheatgrass and sideoats grama are replaced by blue grama, galleta, and ring muhly. Sleepygrass, pricklypear, pinyon pine, and one-seed juniper will also invade this site.

The total annual production of all vegetation is estimated to be 1,500 pounds, air dry, per acre, in years of favorable growing conditions and 600 pounds in unfavorable years. Approximately 85 percent of this total is from plants that furnish forage for cattle.

MALPAIS RANGE SITE

The soils in this site have a cobbly loam, cobbly silt loam, or stony silt loam surface layer. They have bedrock at less than 20 inches or are gravelly or stony throughout. Slopes are 1 to 9 percent. These soils are well drained. They have medium runoff and moderate to slow permeability. Available water capacity is 1 to 3 inches. The hazards of soil erosion and soil blowing are slight or moderate. Elevation is 6,000 to 7,500 feet. Annual precipitation is 14 to 17 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Sideoats grama	20
Little bluestem	20
Western wheatgrass	20
Blue and hairy grama	20
Galleta	5
Big sagebrush	5
Four-wing saltbush	5
Perennial forbs	5

Other plants are broom snakeweed, bluegrass, Indiangrass, mountainmahogany, spike muhly, wolftail, ring muhly, and annual forbs. Under continued heavy grazing, the sideoats grama and little bluestem are replaced by blue grama and perennial forbs. One-seed juniper, pricklypear, and walking stick cholla will also invade this site.

The total annual production of all vegetation is estimated to be 1,400 pounds, air dry, per acre, in years of favorable growing conditions and 500 pounds in unfavorable years. Approximately 80 percent of this total is from plants that furnish forage for cattle.

MEADOW RANGE SITE

The soils in this site are deep. They have a mucky silty clay and clay or very fine sandy loam surface layer. Slopes are 0 to 5 percent. These soils are moderately well drained to very poorly drained. Runoff is

medium to very slow. Permeability is moderate to very slow. A water table is above a depth of 36 inches. Available water capacity is 8 to 10 inches. The hazard of soil erosion is slight or moderate, and the hazard of soil blowing is slight. Elevation is 8,000 to 10,500 feet. Annual precipitation is 18 to 27 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Tufted hairgrass	35
Western wheatgrass	15
Perennial forbs	10
Bog bluegrass	10
Rushes	10
Sedges	10
Meadow barley	5
Shrubby cinquefoil	5

Other species include iris, asters, prairie junegrass, red fescue, muhly grasses, and short-awn foxtail. Under continued heavy grazing, the tufted hairgrass and western wheatgrass are replaced by sedges and rushes. Kentucky bluegrass, redtop, and timothy also invade this site.

The total production of all vegetation of this site in excellent condition is estimated to be 3,000 pounds, air dry, per acre, in favorable years to 1,800 pounds in unfavorable years. Approximately 75 percent of this total is from plants that furnish forage for cattle.

MOUNTAIN GRASSLAND RANGE SITE

The soils in this site are very shallow to deep. They have a stony loam, stony silt loam, clay loam, loam, silt loam, or stony very fine sandy loam surface layer. Slopes are 0 to 30 percent. These soils are well drained, have medium to rapid runoff, and have moderate to very slow permeability. Available water capacity is 2 to 12 inches. The hazards of soil erosion and soil blowing are slight or moderate. Elevation is 7,000 to 11,000 feet. Annual precipitation is 15 to 23 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	15
Prairie junegrass	10
Mountain brome	10
Mountain muhly	10
Sideoats grama	10
Muttongrass	5
Western wheatgrass	10
Pine dropseed	5
Blue grama	15
Gambel oak	5
Ponderosa oak	5
Pinyon pine	5

Other species include one-seed juniper, Arizona fescue, mountainmahogany, sedges, bottlebrush squirreltail, and Parry oatgrass. Under continued heavy grazing, the little bluestem, mountain muhly, mountain brome, and muttongrass are replaced by blue grama, Gamel oak, pinyon pine, and one-seed juniper. Kentucky bluegrass and timothy also invade this site.

The total annual production of all vegetation is estimated to be 1,500 pounds, air dry, per acre, in years of favorable growing conditions and 700 pounds in unfavorable years. Approximately 80 percent of this annual total is from plants that furnish forage for cattle.

MOUNTAIN SHALE RANGE SITE

This site consists of soils that are very shallow to deep. They have a cobbly silty clay loam and stony loam to stony clay loam surface layer. They formed in residuum, colluvium, and alluvium weathered from sandstone and shale. Shale and sandstone outcrops are common. Slopes are 10 to 70 percent.

The soils are well drained. Runoff is rapid to very rapid. Permeability is moderate to very slow. Available water capacity is 1 to 10 inches. The soil erosion hazard is high, and the hazard of soil blowing is slight or moderate. Elevation is 7,000 to 12,000 feet. Annual precipitation is 15 to 27 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Sideoats grama	15
Blue grama	15
Western wheatgrass	10
Little bluestem	10
Pine dropseed	5
Muttongrass	5
Buckwheat	5
Pinyon pine	5
One-seed juniper	10
Gambel oak	15
Mountainmahogany	5

Other species include skunkbush sumac, ponderosa pine, mountain brome, prairie junegrass, spike muhly, sand dropseed, perennial forbs, and annual forbs. Under continued heavy grazing, the western wheatgrass, sideoats grama, and little bluestem are replaced by blue grama and woody plants.

This plant community has an open overstory of pinyon pine and one-seed juniper trees and an understory of shrubs, grasses, and forbs.

The total annual production of all vegetation is estimated to be 600 pounds, air dry, per acre, in years of favorable growing conditions and 300 pounds in unfavorable years. Approximately 65 percent of this total is from plants that furnish forage for cattle.

MOUNTAIN STONY LOAM RANGE SITE

The soils in this site are very shallow to deep. They have a stony silt loam surface layer. Slopes range from 3 to 25 percent. These soils are well drained, have medium to rapid runoff, and have slow permeability. Available water capacity is 1 to 6 inches. The hazard of soil erosion is high or moderate, and the hazard of soil blowing is slight. Elevation is 7,200 to 10,000 feet. Annual precipitation is 15 to 20 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Mountain muhly	20
Sideoats grama	10
Arizona fescue	15

Little bluestem	10
Blue grama	15
Western wheatgrass	10
Prairie junegrass	5
Pine dropseed	5
Sedges	5
Perennial forbs	5

Other species are rubber rabbitbrush, sand dropseed, galleta, vine-mesquite, mountain brome, and bottlebrush squirreltail. Under continued heavy grazing, the mountain muhly, little bluestem, and western wheatgrass are replaced by rubber rabbitbrush, blue grama, and perennial forbs. Livestock distribution can be improved by the use of mechanically constructed stocktrails.

This plant community has a thin overstory of pinyon pine, one-seed juniper, ponderosa pine, limber pine, and Gambel oak.

The total annual production of all vegetation is estimated to be 1,400 pounds, air dry, per acre, in years of favorable growing conditions and 600 pounds in unfavorable years Approximately 90 percent of this total is from plants that furnish forage for cattle.

MOUNTAIN VALLEY RANGE SITE

The soils in this site are deep. They have a loam surface layer. Slopes are 0 to 3 percent. These soils are well drained, have moderate permeability, and have medium runoff. Available water capacity is 8 to 11 inches. The hazards of soil erosion and soil blowing are slight. Elevation is 8,200 to 8,500 feet. Annual precipitation is 16 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Mountain muhly	15
Arizona fescue	10
Needleandthread	10
Mountain brome	10
Blue grama	10
Little bluestem	10
Indiangrass	10
Prairie junegrass	5
Sideoats grama	5
Western wheatgrass	5
Snowberry	5
Perennial forbs	5

Other species on this site are big bluestem, bottlebrush squirreltail, fringed sagewort, sedges, and wolftail. Under continued heavy grazing, the mountain muhly, mountain brome, little bluestem, and needleandthread are replaced by woody plants, shrubs, and perennial forbs. Pinyon pine, one-seed juniper, redtop, timothy, and Kentucky bluegrass will also invade this site.

The total annual production of all vegetation is estimated to be 2,500 pounds, air dry, per acre, in years of favorable growing conditions and 1,200 pounds in unfavorable years. Approximately 80 percent of this annual total is from plants that furnish forage for cattle.

SALT FLATS RANGE SITE

The soils in this site are deep. They have a silt loam and saline silty clay loam surface layer. They are affected by salts. Slopes are 0 to 5 percent. These soils are moderately well drained and well drained, have medium or slow runoff, and have slow to very slow permeability. Available water capacity is 5 to 8 inches. The hazard of soil erosion is moderate or high, and the hazard of soil blowing is moderate. Elevation is 5,800 to 7,600 feet. Annual precipitation is 14 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Alkali sacaton	40
Blue grama	15
Switchgrass	5
Vine-mesquite	10
Western wheatgrass	10
Inland saltgrass	10
Four-wing saltbush	5
Perennial forbs	5

Other species include windmillgrass, alkali muhly, winterfat, and annual forbs. Under continued heavy grazing, the alkali sacaton and western wheatgrass are replaced by inland saltgrass and perennial forbs. Walking stick cholla and pricklypear will also invade this site.

The soils in this site are suitable for range seeding, contour furrowing, and pitting.

The total annual production of all vegetation is estimated to be 1,800 pounds, air dry, per acre, in years of favorable growing conditions and 1,000 pounds in unfavorable years. Approximately 90 percent of this total is from plants that furnish forage for cattle.

SANDY RANGE SITE

The soils in this site are deep. They have a fine sandy loam or sandy loam surface layer. Slopes are 0 to 7 percent. These soils are well drained. They have very slow to slow runoff and have rapid to moderately slow permeability. Available water capacity is 5 to 11 inches. The hazard of soil erosion is moderate or slight, and the hazard of soil blowing is moderate or high. Elevation is 5,800 to 7,500 feet. Annual precipitation is 14 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	20
New Mexico feathergrass	15
Sideoats grama	20
Blue and hairy grama	20
Sand dropseed	5
Western wheatgrass	5
Small soapweed (yucca)	5
Fringed sagewort	5
Winterfat	5

Other species are three-awn, sand bluestem, galleta, black grama, four-wing saltbush, perennial forbs, and annual forbs. Under continued heavy grazing, little bluestem, sideoats grama, and New Mexico feathergrass are replaced by blue grama and perennial forbs. Broom snakeweed and pricklypear will also invade this site.

Soils in this site are suited to seeding, but special considerations must be made to control soil blowing.

The total annual production of all vegetation of this site in excellent condition is estimated to be 1,600 pounds, air dry, per acre, in years of favorable growing conditions and 800 pounds in unfavorable years. Aproximately 80 percent of this total is from plants that furnish forage for cattle.

SHALLOW RANGE SITE

The soils in this site are very shallow or shallow over shale, limestone, or sandstone parent material or have a high content of rock fragments in the soil. They have a fine sandy loam, silty clay loam, loam, silt loam, and gravelly and very gravelly sandy clay loam surface layer. Runoff is slow to rapid and permeability is moderate to very slow. Available water capacity is 1 to 5 inches. The hazards of soil erosion and soil blowing are slight to high. Elevation is 5,000 to 7,500 feet. Annual precipitation is 14 to 18 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	25
Needleandthread	5
New Mexico feathergrass	5
Sideoats grama	25
Blue and hairy grama	20
Three-awn	5
Bottlebrush squirreltail	5
Galleta	10

Other species are Gambel oak, skunkbush sumac, yucca, fringed sagewort, silver bluestem, broom snakeweed, buffalograss, rough tridens, sand dropseed, ring muhly, and winterfat. Under continued heavy grazing, the little bluestem, sideoats grama, and needleandthread are replaced by blue grama, perennial forbs, and annual forbs. Pinyon pine, one-seed juniper, pricklypear, and rubber rabbitbrush also frequently invade this site. Soils in this site are suited to brush management where needed.

The total production of all vegetation is estimated to be 900 pounds, air dry, per acre, in years with favorable growing conditions and 400 pounds in unfavorable years. Approximately 85 percent of this total is from plants that furnish forage for cattle.

SHALLOW SANDSTONE RANGE SITE

The soils in this site are very shallow or shallow over sandstone. They have a stony or nonstony fine sandy loam surface layer. Slopes range from 3 to 30 percent. The soils are well drained. They have medium runoff and moderate to moderately rapid permeability. Available water capacity is 1 to 2 inches. The hazard of soil erosion is high, and the hazard of soil blowing is moderate. Elevation is 5,500 to 6,800 feet. Annual precipitation is 14 to 17 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Little bluestem	20
Sideoats grama	25
New Mexico feathergrass	5
Blue and hairy grama	20
Wolftail	5
One-seed juniper	10
Pinyon pine	5
Gambel oak	5
Skunkbush sumac	5

Other species are silver bluestem, big bluestem, mountainmahogany, and fringed sagewort. Under continued heavy grazing by cattle, the little bluestem, sideoats grama, and New Mexico feathergrass are replaced by blue grama, hairy grama, pinyon pine, and one-seed juniper. Cactus, broom snakeweed, and yuccas invade this site.

The total production of all vegetation is estimated to be 1,000 pounds per acre in favorable years and 500 pounds in unfavorable years. Approximately 80 percent of this total is from plants that furnish forage for cattle.

SUBALPINE GRASSLAND RANGE SITE

The soils in this site are very shallow to deep. They have a cobbly loam and silt loam surface layer. Slopes are 1 to 50 percent. The soils are well drained, have medium to rapid runoff, and are moderately slowly to very slowly permeable. Available water capacity is 1 to 10 inches. The hazard of soil erosion is high or moderate, and the hazard of soil blowing is moderate or slight. Elevation is 7,000 to 11,000 feet. Annual precipitation is 15 to 23 inches.

The approximate species composition of the potential plant community is as follows:

	Percent composition by weight
Mountain muhly	15
Tufted hairgrass	5
Thurber fescue	15
Mountain brome	15
Columbia needlegrass	10
Bluegrass species	10
Western wheatgrass	5
Shrubby cinquefoil	5
Perennial forbs	15
Sedge	5

Other species include Arizona fescue, prairie junegrass, pussytoes, fringed sagewort, locoweed, Parry oatgrass, bellflower, meadow barley, clovers, cow parsnip, Engelmann aster, peavine, and monk's hood. Under continued heavy grazing, the mountain muhly, mountain brome, and Thurber fescue are replaced by shrubby plants and perennial forbs.

The vegetation on this site is primarily used during the summer months.

The total annual production of all vegetation is estimated to be 1,600 pounds, air dry, per acre, in years of favorable growing conditions and 800 pounds in unfavorable years. Approximately 80 percent of this total is from plants that furnish forage for cattle.

Plant glossary

Following is a list of plant names, other than those of domestic grain, that are used in this soil survey. Most of these plants are mentioned in the preceding section, Descriptions of Range Sites.

Common Name	Scientific Name
Alkali muhly	Muhlenbergia asperifolia
Alkali sacaton	Sporobolus airoides
Apacheplume	Fallugia paradoxa
Arizona fescue	Festuca arizonica
Aster	Aster spp.
Big bluestem	Andropogon gerardi
Big sagebrush	Artemesia tridentata
Black grama	Bouteloua eriopoda
Bellflower	Campanula spp.
Blue grama	Bouteloua gracilis
Bluegrass	Poa spp.
Blue spruce	Picea pungens
Bog bluegrass	Poa leptocoma
Bottlebrush squirrel-tail	Sitanion hystrix
Bristlecone pine	Pinus aristata
Broom snakeweed	Gutierrezia sarothrae
Buckwheat	Eriogonum spp.
Buffalograss	Buchloe dactyloides
Cliffrose	Cowania mexicana
Columbia needlegrass	Stipa columbiana
Douglas-fir	Pseudotsuga menziesii
Engelmann aster	Aster engelmannii
Engelmann spruce	Picea engelmannii
Four-wing saltbush	Atriplex canescens
Fringed sagewort	Artemisia frigida
Galleta	Hilaria jamesii
Gambel oak	Quercus gambelii
Green needlegrass	Stipa viridula
Gumweed	Grindelia squarrosa
Hairy grama	Bouteloua hirsuta
Indiangrass	Sorghastrum nutans
Inland saltgrass	Distichlis stricta
Iris	Iris missouriensis
Kentucky bluegrass	Poa pratensis
Limber pine	Pinus flexilis
Little bluestem	Andropogon scoparius
Locoweed	Astragalus spp.
Locust	Robinia neomexicana
Lupine	Lupinus spp.
Mat mulhy	Muhlenbergia richardsonis
Meadow barley	Hordeum brachyantherum
Mockorange	Philadelphus spp.
Monk's hood	Aconitum spp.
Mountain brome	Bromus carinatus
Mountainmahagony	Cercocarpus montanus
Mountain muhly	Muhlenbergia montana
Muttongrass	Poa fendleriana
Needleandthread	Stipa comata
New Mexico feather-grass	Stipa neomexicana
Oak	Quercus spp.
One-seed juniper	Juniperus monosperma
Parry oatgrass	Danthonia parryii
Peavine	Lathyrus spp.
Pine dropseed	Blepharoneuron tricholepis
Pinyon	Pinus edulis
Pinyon ricegrass	Piptochaetium fimbriatum
Plains lovegrass	Eragrostis intermedia
Ponderosa pine	Pinus ponderosa
Prairie junegrass	Koeleria cristata
Pricklypear	Opuntia spp.
Pussytoes	Antennaria spp.
Quaking aspen	Populus tremuloides
Red fescue	Festuca rubra
Red lovegrass	Eragrostis oxylepis
Redtop	Agrostis alba
Ring muhly	Muhlenbergia torreyi
Rocky Mountain juniper	Juniperus scopulorum
Rough tridens	Tridens elongatus
Rubber rabbitbrush	Chrysothamus nauseosus
Rush	Juncus spp.
Sand bluestem	Andropogom hallii
Sand dropseed	Sporobolus cryptandrus
Sand muhly	Muhlenbergia arenicola
Sand sagebrush	Artemisia filifolia
Sedge	Carex spp.
Short-awn foxtail	Alopecurus aequalis
Shrubby cinquefoil	Potentilla fruiticosa
Sideoats grama	Bouteloua curtipendula
Silver bluestem	Andropogon saccharoides
Skunkbush sumac	Rhus trilobata
Sleepygrass	Stipa robusta
Small soapweed (yucca)	Yucca glauca
Snowberry	Symphoricarpos spp.
Spike dropseed	Sporobolus contractus
Spike muhly	Muhlenbergia wrightii
Subalpine fir	Abies lasiocarpa
Sweet clover	Melilotus spp.
Switchgrass	Panicum virgatum
Three-awn	Aristida spp.
Thurber fescue	Festuca thurberi
Timothy	Phleum pratense
Tufted hairgrass	Deschampsia caespitosa
Tumblegrass	Schedonnardus paniculatus
Tumbleweed	Salsola kali
Vine-mesquite	Panicum obtusum
Walking stick cholla	Opuntia spp.
Western ragweed	Ambrosia psilostachya
Western wheatgrass	Agropyron smithii
Windmillgrass	Chloris verticillata
Winterfat	Eurotia lanata
Wolftail	Lycurus phleoides
Wright erigonum	Erigonum wrightii
Yucca	Yucca spp.

Crops[4]

This section deals with the major management used in growing crops on the soils of Colfax County. This kind of management protects the soil from erosion, maintains good tilth, and maintains the plant nutrients that are necessary for long-term, high-level crop production. The most effective way of meeting soil management goals is the selection of the right combination of management practices. The successful farmer applies practices in accordance with the needs of the soils.

This section is divided into three parts: capability grouping, management of irrigated cropland, and management of dry cropland. Table 2 shows estimated yields under optimum management.

The irrigated cropland is generally in two blocks in

[4] J. V. McDONALD, JR., conservation agronomist, Soil Conservation Service, helped prepare this section.

the south-central part of the county, roughly bounded by the towns of Maxwell, Springer, Miami, and Cimarron. Small isolated tracts are in mountain valleys and elsewhere in the county. The dry cropland is mainly in isolated blocks scattered throughout the southeastern part of the county in the vicinity of Farley and Abbott. Isolated blocks are also in mountain valleys and on high mesas.

General management of irrigated crops and pasture

Important practices in managing the irrigated soils are described in the following paragraphs:

Fertilization—The soils of this survey area are generally low in organic-matter content and available nitrogen. Phosphorus is needed for alfalfa and for most truck and fruit crops. Additions of potassium are generally not needed for low and medium levels of crop production. Iron may be deficient for horticultural crops, fruits, nuts, and specialty crops. The amount of fertilizer needed depends on the crop to be grown, the past cropping history, the level of yield desired, and the kind of soil. It should be based on the results of soil tests or plant tissue tests.

Management of irrigation water—Approximately 31,000 acres in Colfax County has established water rights. About 26,000 acres is served by five irrigation associations, ditch companies, or ditch associations. About 5,000 acres is served by small ditch associations or by individual ditches. Most of the larger companies started as private business ventures but are now mutual companies or associations.

The largest irrigation system in the county is the Vermejo Conservancy District. This system was first started in 1897 and was renovated by the Bureau of Reclamation. It was completed in 1955. The Vermejo Conservancy District serves 54 users and irrigates about 7,379 acres of land near the village of Maxwell. The district is capable of storing about 25,000 acre-feet of water diverted from the Vermejo River and Chicorica Creek. Inadequate distribution systems and insufficient runoff frequently result in an inadequate water supply.

The Springer Ditch Company, a mutual company, serves 45 users, irrigating about 6,000 acres in the vicinity of Springer. This ditch company has the capability to store 4,000 acre-feet in Springer Lake and supplemental storage in Eagle Nest Lake. Water rights are 15 inches per acre from the Cimarron Creek.

The C. S. Main Canal serves about 5,800 acres southeast of Cimarron with 18 inches of water per acre. This system is an enterprise of the C. S. Cattle Company that serves other owners. Storage capacity is about 86,000 acre-feet in Eagle Nest Lake, which it shares with the Springer Ditch Company. This system has the most reliable water supply in the county. It has prior water rights to all others on the Cimarron Creek.

The Farmers Development Company supplies 38 users with water for 2,200 acres of cultivated land and 4,000 acres standby land around the village of Miami. This system has storage capability of about 5,600 acre-feet. The system has water rights on 50 cubic feet per second direct flow and 260 cubic feet per second floodwaters of Rayado Creek.

The Antelope Valley Irrigation District serves 46 users on about 5,000 acres. Water rights are younger than those of the Springer Ditch Company and therefore are dependent on the needs of the Springer Ditch Company being filled before any water is available. The Antelope Valley has two small reservoirs with the capacity of about 6,200 acre-feet. Adequate water for irrigation is uncertain.

Other conservation practices that are referred to in the irrigated capability units are defined in the Glossary.

The objectives of management and treatments are much broader than those listed. They also include quality in the resource base, standard of rural living, and maintenance or improvement of the environment.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest, and for engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, the subclass, and the unit. These levels are described in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations

that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIs–1 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Only the capability units in classes II, III, and IV are represented in Colfax County and the capability subclasses in classes VI, VII, and VIII. All are shown in the "Guide to Mapping Units" at the back of this soil survey. Brief descriptions are given on the pages that follow.

Management of irrigated soils

On the following pages the irrigated soils of the county are described by capability units, and their use and management is suggested.

The capability units in this county are numbered within a system of capability classification that is used throughout the land resource area of which this county is a part. Not all the capability units in this system, however, are recognized in Colfax County. For this reason some of the numbers are not consecutive.

CAPABILITY UNIT IIe–2 IRRIGATED

The only soil in this unit, Seelez fine sandy loam, dark, 0 to 1 percent slopes, is deep and well drained. The surface layer and next layer are fine sandy loam. The substratum is fine sandy loam and loamy sand. The soil is rapidly permeable. Runoff is slow. Soil blowing is a moderate hazard. Available water capacity is 5 to 7 inches. The effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches, and the frost-free season is 130 to 160 days.

This soil is suitable for all cultivated crops and pasture plants commonly grown in the county. Alfalfa, small grain, corn, and millet are the chief crops. Sprinklers are suitable in irrigating.

A plant cover of grasses, legumes, or high residue crops on an average of one-third of the time reduces the hazard of soil blowing and improves the available water capacity. Mulching or maintaining crop residue on the surface also reduces soil blowing. A crop rotation that includes at least 3 years of grasses and legumes is essential.

Diversions or dikes are needed in some areas on bottom land to protect those areas from outside water.

Protecting the soil from blowing and maintaining or improving the organic-matter content, the fertility, and the available water capacity are the chief management objectives.

CAPABILITY UNIT IIe–5 IRRIGATED

The only soil in the unit, Manzano loam, is a deep, well drained soil with a loam surface layer, a clay loam subsoil, and a clay loam substratum. Slopes are 0 to 2 percent. The soil is moderately or moderately slowly permeable. Runoff is slow, and the erosion hazard is moderate. The hazard of soil blowing is also moderate. Available water capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

This soil is suitable for all cultivated crops and pasture plants commonly grown in the county. Alfalfa, small grain, and millet and corn for grain and silage are the chief crops. Surface, subsurface, and sprinkler irrigation are suitable.

A plant cover of grasses, legumes, or high residue crops on an average of one-third of the time maintains good tilth and reduces erosion. A crop rotation that includes at least 3 years of grasses and legumes is essential. Diversions or dikes are needed to protect some areas of bottom lands from outside water.

Protecting the soil from erosion and maintaining or improving the organic-matter content, the fertility, and the tilth are the chief management objectives.

CAPABILITY UNIT IIe–6 IRRIGATED

This capability unit consists of deep, well drained soils with a silt loam, silty clay loam, or loam surface layer; a silty clay loam or clay loam subsoil; and a silt loam, clay loam, or silty clay loam substratum. Slopes are 1 to 3 percent. The soils are moderately or moderately slowly permeable. Runoff is medium, and water erosion is a moderate hazard. The hazard of soil blowing is also moderate. Available water capacity is 10 to 13 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

These soils are suitable for growing all cultivated crops and pasture plants commonly grown in the county. Alfalfa, small grain, and millet and corn for grain and silage are the chief crops. The soils are suitable for surface irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of one-third of the time helps maintain good tilth and reduce erosion. A crop rotation that includes at least 3 years of grasses or legumes is essential.

Land leveling is required where slopes are greater than 1 percent. Field investigations are necessary before making deep cuts during land leveling because of underlying lime layers.

Maintaining or improving the organic-matter content, the fertility, and the physical condition; protecting the soil from soil blowing and water erosion; and offsetting the moderately slow permeability are the chief management objectives.

CAPABILITY UNIT IIs-1 IRRIGATED

This capability unit consists of deep, well drained soils with a silt loam surface layer, a clay and silty clay subsoil, and a silty clay loam substratum. Slopes are 0 to 2 percent. The soils are slowly or very slowly permeable. Runoff is slow, and water erosion is a slight hazard. The hazard of soil blowing is slight or moderate. Available water capacity is 9 to 12 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

These soils are suitable for all cultivated crops and pasture plants commonly grown in the county. Alfalfa, small grain, and millet and corn for grain and silage are the chief crops. The soils are suited to surface irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of one-third of the time improves soil tilth and permeability. A crop rotation that includes at least 3 years of grasses or legumes is essential.

Land leveling is needed where slopes are greater than 1 percent.

Maintaining or improving the organic-matter content, the fertility, the tilth, and the water intake rate are the chief management objectives.

CAPABILITY UNIT IIIe-1 IRRIGATED

This capability unit consists of deep, well drained soils with a loam, silt loam, or silty clay loam surface layer; a loam, clay loam, silty clay loam, or silty clay subsoil; and a silt loam, sandy clay loam, clay loam, or silty clay loam substratum. Slopes range from 3 to 9 percent, but most are 3 to 5 percent. The soils are moderately to slowly permeable. Runoff is medium or rapid, and soil erosion is a high hazard. The hazard of soil blowing is moderate. Available water capacity is 8 to 13 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

Barley, oats, wheat, and alfalfa are the chief crops. The soils are suited to pasture and hay crops. They are suited to sprinkler irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of one-half of the time maintains good tilth and reduces erosion. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Special water management, including protection from flooding, benefits some soils. Others benefit from land leveling.

Maintaining or improving the organic-matter content, the fertility, the tilth, and the water intake rate, and protecting the soil from water erosion are the chief management concerns.

CAPABILITY UNIT IIIe-4 IRRIGATED

This capability unit consists of deep, well drained soils with a fine sandy loam surface layer, a sandy clay loam subsoil, and a fine sandy loam and sandy clay loam substratum. Slopes are mainly 0 to 3 percent but range to 5 percent. The soils are moderately permeable. Runoff is slow and water erosion is a slight hazard. The hazard of soil blowing is high. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 17 inches. The frost-free season is 130 to 160 days.

The soils in this unit are suitable for all cultivated crops and pasture plants commonly grown in the county. Alfalfa, small grain, and millet and corn for grain and silage are the principal crops. The soils are suitable for surface, subsurface, or sprinkler irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of one-half of the time reduces soil blowing. A crop rotation that includes at least 3 years of grasses and legumes is essential.

Land leveling is required where slopes are greater than 1 percent. Emergency tillage is needed on some areas to protect the soils from blowing.

Maintaining or improving the organic-matter content and fertility and protecting the soil from blowing are the chief management objectives.

CAPABILITY UNIT IIIe-8 IRRIGATED

This capability unit consists of deep, well drained soils with a silty clay loam or silt loam surface layer, a clay or silty clay loam subsoil, and a silty clay loam substratum. Slopes are 1 to 3 percent. The soils are very slowly or slowly permeable. Runoff is medium, and soil erosion is a moderate hazard. The hazard of soil blowing is moderate. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

These soils are suitable for all cultivated crops and pasture plants commonly grown in the county. Small grain and alfalfa are the chief crops. The soils are suitable for surface irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of one-half of the time maintains soil tilth and reduces erosion. A crop rotation that includes at least 3 years of grasses or legumes is essential.

Land leveling is required where slopes are greater than 1 percent.

Maintaining or improving the organic-matter content, the fertility, the tilth, and the water intake rate and protecting the soil from water erosion are the chief management objectives.

CAPABILITY UNIT IVe-2 IRRIGATED

This capability unit consists of deep, well drained soils with a loam or clay loam surface layer; a clay loam, silty clay loam, or sandy clay loam subsoil; and a sandy clay loam, clay loam, or silty clay loam substratum. Slopes are 0 to 7 percent. The soils are moderately permeable. Runoff is medium, and soil erosion is a moderate hazard. The hazard of soil blowing is slight. Available water capacity is 8 to 12 inches. Effective rooting depth is 60 inches or more. Precipitation is 16 to 18 inches. The frost-free season is less than 90 days.

The choice of crops is restricted because of the short growing season. Wheat, barley, and hay are the chief crops. The soils are suited to pasture and hay crops.

They are suited to surface irrigation systems, but irrigation water is limited.

Grasses and legumes in the rotation, mulching, and maintaining crop residues on the surface each year maintain tilth and reduce erosion.

Land leveling is required where slopes are greater than 1 percent. Maintaining or improving the organic-matter content, the fertility, the tilth, and the water intake rate; protecting the soil from water erosion; and offsetting the effect of the short growing season are the chief management objectives.

CAPABILITY UNIT IVe-9 IRRIGATED

The only soil in this unit, Litle clay loam, 1 to 3 percent slopes, is a moderately deep, well drained soil with a clay loam surface layer and a clay subsoil and substratum. The depth to shale is 20 to 40 inches. This soil is slowly permeable. Runoff is rapid, and soil erosion is a high hazard. The hazard of soil blowing is moderate. Available water capacity is 3 to 4 inches. Effective rooting depth is 20 to 40 inches. Precipitation is 14 to 17 inches. The frost-free season is 120 to 160 days.

The soil is suited to all pasture and hay plants commonly grown in the county. Barley, wheat, corn, and alfalfa are the chief crops. The soil is suited to surface irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of two-thirds of the time maintains good tilth and reduces erosion. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Field investigations are necessary before deep cuts are made during land leveling because of the underlying shale.

Land leveling is required where slopes are greater than 1 percent. Maintaining or improving the organic-matter content, the fertility, the tilth, and the water intake rate and protecting the soil from water erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IVw-2 IRRIGATED

This capability unit consists of deep, moderately well drained soils with a very fine sandy loam surface layer, a loam and sandy clay loam subsoil, and a fine sandy loam and silt substratum. Slopes are 1 to 5 percent. The soils are moderately permeable. Runoff is medium, and the erosion hazard is slight. The hazard of soil blowing is slight. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. The seasonal high water table is at a depth of 36 to 60 inches or more. Precipitation is 16 to 19 inches. The frost-free season is less than 90 days.

The choice of crops is restricted because of the short growing season. Wheat, barley, and hay are the chief crops. The soils are suited to pasture and hay crops. They are suited to surface irrigation systems, but irrigation water is limited.

Grasses, legumes, or high residue crops in the rotation or mulching each year is essential.

Land leveling is required in areas where slopes are greater than 1 percent.

Maintaining or improving the organic-matter content, the fertility, the tilth and water intake rate, and in some areas the drainage are the chief management objectives.

CAPABILITY UNIT IVs-9 IRRIGATED

This capability unit consists of deep, moderately well drained to well drained saline soils with a silty clay loam surface layer over clay, silty clay, or silty clay loam. Slopes are 0 to 3 percent. The soils are slowly to very slowly permeable. Runoff is slow to medium, and soil erosion hazard is moderate or high. The hazard of soil blowing is moderate. Available water capacity is 9 to 12 inches. Effective rooting depth is 60 inches or more. The seasonal water table is at a depth of 72 inches or more. The soils are slightly to moderately saline with 0.15 to 0.35 percent total soluble salts. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

Salinity limits the choice of crops. Barley, wheat, and alfalfa are the chief crops. Salt-tolerant pasture grasses are well suited to these soils. These soils are suited to surface irrigation systems.

A plant cover of grasses, legumes, and high residue crops on an average of two-thirds of the time reduces soil erosion and soil blowing and helps maintain good tilth and the water intake rate. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Some soils need special water management or leaching of toxic salts, or both.

Maintaining and improving the organic-matter content, the fertility, the tilth and the water intake rate, and protecting the soil from water erosion and soil blowing are the chief management objectives.

Management of dryland soils

Controlling erosion and maintaining tilth and fertility are the chief management needs on the dryland soils of the county. Inadequate and irregular rainfall, torrential showers, and high winds of long duration are hazards for dryland crops.

The capability units for dryland soils are numbered within a system of capability classification that is used throughout the land resource area of which this county is a part. Because not all the capability units in this system are recognized in the county, some of the numbers are not consecutive. Capability unit IVe–1, for example, is divided into IVe–1 Southern Rocky Mountains Major Land Resource Area (RM) and IVe–1 Southern High Plains Major Land Resource Area (HP) (13B).

The soils in the county that are not cultivated but are used only for range, woodland, wildlife habitat, or watershed are classified by subclass. These soils require different management from the same soils that are under cultivation.

On the pages that follow are descriptions of the capability units and subclasses under dryland farming.

CAPABILITY UNIT IIIe-1 DRYLAND

This capability unit consists of deep, well drained soils with a loam surface layer, a clay loam subsoil, and a clay loam substratum. Slopes are 0 to 3 percent. The soils are moderately and moderately slowly permeable. Runoff is slow or moderate, and the hazard of erosion is slight or moderate. The hazard of soil blowing is moderate. Available water capacity is 7 to 12 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

Wheat, sorghum, and millet and corn for silage are the chief crops.

A plant cover of grasses, legumes, and high residue crops on an average of one-half of the time on level soils and two-thirds of the time on soils with slopes greater than 1 percent reduces the hazard of soil blowing and improves or maintains the water intake rate. A crop rotation that includes at least 3 years of grasses and legumes is essential.

Terracing and contour farming are needed in some areas of level land and are essential where slopes are greater than 1 percent unless continuous, closely spaced high residue crops are grown.

Diversions or dikes are needed in some bottom land areas of Manzano soils to protect them from outside water.

Maintaining or improving the organic-matter content, the fertility, the tilth, and the intake rate and protecting the soil from erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IIIe-2 DRYLAND

This capability unit consists of deep, well drained soils with a silt loam surface layer, a clay and silty clay loam subsoil, and a silty clay loam substratum. Slopes are 0 to 3 percent. The soils are very slowly permeable. Runoff is slow or medium and soil erosion is a slight or moderate hazard. The hazard of soil blowing is moderate. Available water capacity is 9 to 11 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

Wheat, sorghum, and millet and corn for silage are the chief crops.

A plant cover of grasses, legumes, and high residue crops on an average of two-thirds of the time on level soils and three-fourths of the time on soils with slopes greater than 1 percent reduces the soil erosion and soil blowing and maintains or improves the water intake rate. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Terracing and contour farming are needed on some level land and are essential where slopes are greater than 1 percent unless continuous, closely spaced high residue crops are grown.

Maintaining and improving the organic-matter content, the fertility, the tilth, and the water intake rate and protecting the soil from water erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IIIe-3 DRYLAND

This capability unit consists of deep, well drained soils with a fine sandy loam or sandy loam surface layer, underlain by clay loam, sandy clay loam, fine sandy loam, or loamy sand. Slopes are 0 to 3 percent. The soils are moderately slowly to rapidly permeable. Runoff is slow and soil erosion is a slight hazard. The hazard of soil blowing is high. Available water capacity is 5 to 11 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days. The soils in this unit are subject to occasional flooding unless protected by dikes.

Wheat, millet, and perennial pasture or hay are the chief crops. A plant cover of grasses, legumes, or high residue crops on an average of three-fourths of the time reduces the soil blowing hazard. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Emergency tillage is essential to reduce soil blowing where crop residue is inadequate. Wind stripcropping is needed in some areas. Diversions or dikes are needed in places to protect the soils from outside water.

Maintaining and improving the organic-matter content, the fertility, and the tilth and protecting the soil from water erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IVe-1 (HP) DRYLAND

This capability unit consists of deep, well drained soils with a fine sandy loam surface layer, a loam and clay loam subsoil, and a loam and clay loam substratum. Slopes are 1 to 5 percent. The soils are moderately or moderately slowly permeable. Runoff is slow to very slow, and soil erosion is a moderate hazard. The hazard of soil blowing is high. Available water capacity is 7 to 12 inches. Effective rooting depth is 60 inches or more. Precipitation is 14 to 18 inches. The frost-free season is 130 to 160 days.

Wheat and millet and perennial pasture or hay are the chief crops.

A plant cover of grasses, legumes, and high residue crops on an average of three-fourth of the time prevents soil erosion and soil blowing. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Emergency tillage and wind stripcropping are needed to protect the soils from soil blowing. Diversions or dikes are needed in some areas to protect the soils from outside water.

Maintaining and improving the organic-matter content, the fertility, and the tilth and protecting the soil from water erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IVe-1 (RM) DRYLAND

This capability unit consists of deep, well drained soils with a silt loam, stony silt loam, loam, silty clay loam, clay loam, cobbly loam, or sandy clay loam surface layer; a silty clay, silty clay loam, loam, sandy clay loam, clay loam, gravelly clay, clay, or stony clay subsoil; and a sandy clay, gravelly sandy clay loam, clay loam, silty clay loam, gravelly clay, or silty clay substratum. Slopes range from 0 to 9 percent but are mainly 0 to 5 percent. The soils are moderately to very slowly permeable. Runoff is medium, and soil erosion is a moderate hazard. The hazard of soil blowing is slight or moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is 5 to 12 inches. Precipitation is 15 to 20 inches. The frost-free season is less than 90 to 120 days.

Small grain and pasture and hay are the main crops. The soils generally receive supplemental irrigation water if it is available.

A plant cover of grasses, legumes, or high residue crops on an average of three-fourths of the time maintains good tilth and the water intake rate and reduces erosion. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Terracing and contour farming are needed on level land and are essential where slopes are greater than

1 percent unless continuous, closely spaced, high residue crops are grown.

Maintaining and improving the organic-matter content, the fertility, the tilth, and the water intake rate and protecting the soil from water erosion and soil blowing are the chief management objectives.

CAPABILITY UNIT IVe-3 DRYLAND

The only soil in this unit, Dallam loamy fine sand, 0 to 3 percent slopes, is a deep, well drained soil with a loamy fine sand surface layer and a clay loam and sandy clay loam subsoil. Slopes are 0 to 3 percent. The soil is moderately permeable. Runoff is slow, and soil erosion is a slight hazard. The hazard of soil blowing is high. Available water capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more. Precipitation is 15 to 18 inches. The frost-free season is 130 to 160 days.

Wheat, millet, and perennial pasture and hay are the chief crops.

A plant cover of grasses, legumes, and high residue crops on an average of three-fourths of the time reduces the hazard of soil blowing. A crop rotation that includes at least 4 years of grasses and legumes is essential.

Emergency tillage and wind stripcropping help prevent soil blowing where crop residue is inadequate.

Maintaining or improving the organic-matter content, the fertility, and the tilth and protecting the soil from soil blowing are the chief management objectives.

CAPABILITY UNIT IVw-1 DRYLAND

The one soil in this unit, Frolic very fine sandy loam, 1 to 5 percent slopes, is deep and moderately well drained. The surface layer is very fine sandy loam. The subsoil is loam and sandy clay loam. The substratum is fine sandy loam and silt. The soil is moderately permeable. Runoff is medium. The hazards of water erosion and soil blowing are slight. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. The seasonal high water table is at a depth of 36 to 60 inches. Precipitation is 16 to 19 inches. The frost-free season is less than 90 days.

This soil is suited to all pasture and hay crops commonly grown in the county. Small grain is the chief crop. The soil generally receives supplemental irrigation water when it is available.

A plant cover of grasses, legumes, and high residue crops on an average of three-fourths of the time improves or maintains organic-matter content and helps prevent soil blowing. A crop rotation that includes at least 4 years of grasses and legumes is essential. Some areas need drainage.

Maintaining or improving the organic-matter content, the fertility, and the tilth are the chief management objectives.

CAPABILITY SUBCLASS VIe DRYLAND

The soils in this subclass have severe limitations that make them generally unsuitable for cultivation. The limiting factors are steep slopes, susceptibility to erosion or soil blowing, effects of past erosion, or a combination of these factors. Additional information can be found under the headings "Range" and "Woodland."

CAPABILITY SUBCLASS VIw DRYLAND

The soils in this capability subclass have severe limitations that make them generally unsuitable for cultivation. The limiting factors are excessive wetness or damaging overflow. Additional information can be found under the heading "Range."

CAPABILITY SUBCLASS VIs DRYLAND

The soils in this subclass have severe limitations that make them generally unsuitable for cultivation. The limiting factors are shallow depths, excess rock fragments, salinity, low available water capacity, or a combination of these factors. Additional information can be found under the headings "Range" and "Woodland."

CAPABILITY SUBCLASS VIIe DRYLAND

The soils of this subclass have severe, continuing limitations that make them unsuitable for cultivation. The limiting factors are steep and very steep slopes, susceptibility to soil blowing and water erosion, or a combination of these factors. Additional information can be found under the headings "Range" and "Woodland."

CAPABILITY SUBCLASS VIIs DRYLAND

The soils of this subclass have very severe, continuing limitations that make them unsuitable for cultivation. The limiting factors are very shallow depth, excess rock fragments, low available water capacity, or a combination of these. Additional information can be found under the headings "Range" and "Woodland."

CAPABILITY SUBCLASS VIIIw DRYLAND

The soils of this subclass have limitations that make them generally unsuitable for agricultural uses. They are used chiefly for wildlife habitat and watershed. These areas are alluvial deposits along the bottoms of the major drainages.

CAPABILITY SUBCLASS VIIIs DRYLAND

The soils in this capability subclass have limitations that make them generally unsuitable for agricultural use. They are used chiefly for wildlife habitat, watershed, and esthetic purposes. These areas are cinder hills, mounds or piles of stones, or bare rock outcrops.

Estimated yields

The per acre average yields that can be expected of the principal crops under a high level of management are shown in table 2. In any given year, yields may be higher or lower than those indicated in table 2 because of seasonal variations in rainfall and other climatic factors. Absence of a yield estimate indicates that the crop is not suited to or is not commonly grown on the soil, or that irrigation of a given crop is not commonly practiced on the soil.

The predicted yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The latest soil and crop management practices used by many farmers in the county are assumed in predicting the yields. Hay and pasture yields are predicted

TABLE 2.—*Yields per acre of crops and pasture*

[Yields in columns N are for nonirrigated soils; those in columns I are for irrigated soils. All yields were estimated for a high level of management in 1974. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Alfalfa hay		Barley		Corn silage		Hay crops, annuals		Wheat, winter		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I
	Ton	*Ton*	*Bu*	*Bu*	*Ton*	*Ton*	*Ton*	*Ton*	*Bu*	*Bu*	*AUM* [1]	*AUM* [1]
Barela:												
[2] BE:												
Barela part			25				1.4		19			
Barela part												
Yankee part			16				1.1		13			
Berthoud:												
BhD		4.5		45				2		40		9
Brycan:												
[2] BR:												
Brycan part [3]			35				1.6		27			
Brycan part [3]			30				1.4		23			
Colmor:												
CrB, CsB		5		65		25		3		55		10
CrC, CsC		4.5		50				2		40		9
Dalhart:												
DaB		5		65		20		2.5		55		10
DaC		4.5		50				2		40		9
Dallam:												
DmB							1.5		15			
Deacon:												
[2] DR:												
Deacon part		4.5		45				2		40		9
La Brier part		4.5		45				2		40		9
Manzano part		5		60				2.5		55		10
Dioxice:												
DxC					10		1.8		25			
Frolic:												
[2] FC												
Frolic part [3]			31				1.5		25			
Cumulic Haplaquolls part												
Gruver:												
GaB, GbB					10		1.8		25			
La Brier:												
Lb		5		60	8	25	1.6	2.5	20	50		10
Lc		3.5		45						40		7
Litle:												
LtB		3.5		45		15		1.7		40		7
Manzano:												
Ma		5		65	10	25	1.8	3	25	55		10
Morval:												
[2] MT:												
Morval part [3]			31				1.5		25			
Moreno part			24				1.2		19			
Ring:												
[2] RG:												
Ring part												
Brycan part [3]			31				1.5		25			

TABLE 2.—*Yields per acre of crops and pasture*—Continued

Soil name and map symbol	Alfalfa hay		Barley		Corn silage		Hay crops, annuals		Wheat, winter		Pasture	
	N	I	N	I	N	I	N	I	N	I	N	I
	Ton	*Ton*	*Bu*	*Bu*	*Ton*	*Ton*	*Ton*	*Ton*	*Bu*	*Bu*	*AUM* [1]	*AUM* [1]
Seelez:												
SnA	----	5	----	65	----	20	1.5	2.5	15	55	----	10
Swastika:												
SoA	----	5	----	65	----	25	----	3	----	55	----	10
SpD	----	4.5	----	45	----	----	----	2	----	40	----	9
SsB	----	4.5	----	55	----	15	----	2	----	45	----	9
St	----	3.5	----	45	----	----	----	----	----	40	----	7
Vermejo:												
Ve, Vm	----	3.5	----	40	----	----	----	----	----	35	----	7

[1] Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.
[2] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.
[3] Yields are for nonirrigated soils with supplemental water for irrigation when available.

for varieties of grasses and legumes suited to the soil. A few farmers may be using more advanced practices and are obtaining average yields higher than those shown in the table.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation, and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crop grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The predicted yields reflect the relative productive capacity of the soils for each of the principal crops. Yields are less likely to increase in the future as new production technology is developed. The relative productivity of a given soil compared to other soils, however, is not likely to change.

Crops other than those shown in table 2 are grown in the survey area, but because their acreage is small, predicted yields for these crops are not included. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the productivity and management concerns of the soils for these crops.

Woodland [5]

This section contains interpretations for soils in Colfax County that are used and managed as woodland. About 465,000 acres of Colfax County is commercial forest land, most of which is located at higher elevations where the environment is favorable for trees. The occurrence of native species and their management considerations, site quality, erosion hazard, limitations for the use of heavy equipment, mortality of tree seedlings, natural competition from undesirable plants, and windthrow hazard are examined.

Most of the forested areas have been cutover in the past, and the present stands consist of saplings, poles, and small, second growth saw logs. Harvesting operations are still underway in parts of the area. Timber from these harvesting operations is used to support local sawmills.

Ponderosa pine, Douglas-fir, white fir, and Engelmann spruce (*4*) are the major commercial species. Other less important species are limber pine, bristlecone pine, subalpine fir, blue spruce, quaking aspen, pinyon pine, one-seed juniper, and Rocky Mountain juniper. Ponderosa pine (*7*) and Douglas-fir presently have more commercial value than the other species.

Pinyon pine, one-seed juniper, and Rocky Mountain juniper are mainly at elevations of 6,000 to 7,000 feet. Both species are used for fuel, and juniper is used for fence posts. Pinyon pine and one-seed juniper are likely to be found on Ponil and Laporte soils.

Ponderosa pine grows at elevations above 7,000 feet, or where there is approximately 18 to 22 inches of annual precipitation. It extends to an elevation of about

[5] CARY W. HULL and LEWIS H. JUMP, Soil Conservation Service, helped prepare this section.

8,500 feet where it merges into the mixed conifer type. It grows well on Dargol and Stout soils.

Ponderosa pine grows on soils formed in a variety of parent materials. These soils, however, are usually low in organic-matter content and neutral in reaction.

Soil variation affecting distribution of ponderosa pine is more likely to be physical rather than chemical. Variations in depth, physical composition, and organic-matter content exert an important influence on the amount of moisture available for tree growth. Sandy or gravelly soils are generally more favorable to the establishment of ponderosa pine reproduction, but growth on clay soils is usually good once trees have passed the seedling stage.

Available light and moisture are considerations in management. Spacing should be regulated throughout the life of the stand to obtain adequate growth.

Dense stocking is desirable in young stands to encourage form and natural pruning. Once the dominant trees are established, however, they should be given sufficient space to obtain maximum diameter growth.

The mixed conifer type is a mixture of ponderosa pine, Douglas-fir, white fir, and quaking aspen. It occurs at elevations of 7,500 to 10,000 feet. Douglas-fir is the most important lumber species in this type and is used extensively in heavy construction. Mixed conifers grow well on Bundo, Burnac, Cypher, Etoe, Etown, and Fuera soils. Douglas-fir does not grow well on poorly drained soils or on soils with an impervious layer near the surface.

The natural regeneration of Douglas-fir is greatly influenced by the character of the soil, especially the surface layer. A loose, granular soil is more favorable than tight clay soils because root development is not restricted. Granular soils are also less subject to frost heaving. Light colored soils are more favorable than dark ones because the surface does not attain such high temperatures.

The successful natural regeneration of Douglas-fir largely depends on the presence and nature of litter. Litter is especially important on fine textured soils where pores may be sealed by falling rain. Pine needle litter is more conducive to Douglas-fir reproduction than either Douglas-fir or white fir litter. Because they are fairly long, pine needles produce an open, lattice-like litter, which allows moisture to percolate and keeps the soil friable. Douglas-fir seedlings are often found growing under a ponderosa pine canopy because of the favorable nature of the litter. The susceptibility of Douglas-fir to windthrow and the esthetic values involved should be considered in harvesting.

The spruce-fir type extends from elevations of about 9,000 feet to the timberline. The main species are Engelmann and blue spruce, subalpine fir, and quaking aspen and a scattering of bristlecone and limber pine. The most important lumber species is Engelmann spruce, which has uses ranging from violin construction to home building. This spruce-fir type grows well on Angostura and Tolby soils.

Engelmann spruce grows well on moderately deep, well drained silt and clay loam soils derived from basalt, intrusive rocks, shale, or limestone. It also grows well on alluvial soils derived from a wide range of parent material, where an accessible water table is more important than physical soil properties.

Engelmann spruce does not grow well on shallow, dry, coarse-textured, sandy and gravelly soils derived primarily from granitic and schistosic rock and coarse-grained sandstone, clay surface soils, or saturated soils.

Engelmann spruce has a short first year root penetration (about 1½ inches) and does not regenerate well on soils with a thick organic layer. Fifty percent shade is ideal for spruce regeneration and early growth. Juvenile growth is slow. It takes about 20 years to grow 5 feet in height in heavily shaded stands. Further growth is generally faster.

Gross growth in old stands varies from near 0 to 200 board feet per acre per year, but young stands can grow as much as 300 feet or more if managed.

Engelmann spruce clear cuts should be limited to 20 acres or less. Sharp corners and edges should be avoided in cutting patterns to assist in controlling windthrow. The shallow root system of Engelmann spruce makes it particularly susceptible to windthrow, especially after partial cutting.

Cull logs should be removed to prevent spruce bark beetles from using them as breeding areas. If necessary, the logs should be burned to kill beetles.

Average volumes per acre in old-growth spruce-fir may be practically nothing at the timberline; 5,000 to 15,000 board feet per acre on poor sites; and up to 40,000 board feet on better sites.

Grazing potential on the spruce-fir type is generally limited to mountain meadows, roadsides, and cutover areas.

Adequate forest management must provide for the regeneration, growth, protection, and harvest of forest products. Indirect benefits other than timber production are also derived from a well managed forest. The surface roots bind the soil and help control erosion. The forest litter breaks the impact of raindrops and prevents damage to the soil structure. The litter also absorbs water, and the tree roots keep the soils porous.

Reforestation in Colfax County is achieved primarily through natural means without much site preparation. Under good management, some plantings may be required to insure fully stocked stands.

An equal number of the taller trees were measured in the evaluation of the potential of woodland sites in the area. The heights and ages of at least 4 trees were measured on each of 172 plots studied. The soils in each plot were identified and described. Potential soil productivity was determined for the dominant species in each timber type. Ponderosa pine was used as the indicator species in the pine type. Douglas-fir was used in the mixed conifer type, and Engelmann spruce was used in the spruce-fir type. The growth and yield information for Engelmann spruce and Douglas-fir contained in this survey is only tentative, because of the lack of research data and the high variability of growth conditions in the survey area.

Site classes

The relative productivity of a soil's wood producing ability can be expressed by site classes.

Under this system, the highest producing soil is designated as being site class 1 and the poorest as site class 7, although the Colfax County area mostly contains sites in classes 5, 6 and 7, because of the climate. Some higher producing sites exist in local areas

where soil and moisture conditions are more favorable. The grouping of soils into site classes is based on site index, which is the average total height of taller trees in the stand at a given age. This age is 100 years for ponderosa pine and Douglas-fir and 50 years for Engelmann spruce.

Woodland management

Table 3 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for those soils suitable for wood crops are listed alphabetically by soil name, and the ordination symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the symbol, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; 5, moderately low; 6, low; and 7, very low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of rock fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates no significant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the order in which the letters are listed above—*x*, *w*, *t*, *d*, *c*, *s*, *f*, and *r*.

The third part of the symbol distinguishes the groups according to degree of difficulty in applying woodland management. A numeral 3, for example, means that woodland management is more difficult to apply than if the numeral were 1 or 2.

In table 3 the soils are also rated for a number of factors to be considered in management. The ratings of slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of equipment limitation reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of windthrow hazard are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of plant competition indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The potential productivity of merchantable trees on a soil is expressed as a site index. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Woodland suitability groups

Soils in the county have been assigned to woodland suitability groups, primarily according to their potential productivity. Each group consists of soils that have about the same productive capability and require about the same kind of management.

WOODLAND SUITABILITY GROUP 3f1

In this group are soils of the Angostura series. The average productivity for aspen is site class 3, using a base age of 80 years. The average site index for quaking aspen is 62.

The soils are deep and well drained. They have a stony loam, stony fine sandy loam, or stony sandy loam surface layer. Runoff is medium. Permeability is moderate. The content of rock fragments in the subsoil is greater than 35 percent. Available water capacity is 2 to 6 inches. Slopes are 20 to 60 percent.

The principal species are quaking aspen, Engelmann spruce, and subalpine fir. The common understory plants are kinnikinnick, whortleberry, shrubby cinquefoil, Thurber fescue, tufted hairgrass, pine dropseed, tall oatgrass, and mountain muhly.

Quaking aspen, unlike other commercial woodland species, is not confined to specific soils, landscapes, temperature regimes, or moisture regimes. Because of this, it grows on a variety of soils and landscapes in Colfax County. Because productivity and management of aspen in the county are similar, there is only one woodland suitability group. Angostura soils were used as a basis for the woodland suitability group because they support much of the quaking aspen in Colfax County.

Management considerations are for quaking aspen. Understory species, such as Douglas-fir, white fir, and Engelmann spruce, should also be considered for future management when they are present.

TABLE 3.—*Woodland management and productivity*

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity[1]		Trees to plant
		Windthrow hazard	Equipment limitation	Seedling mortality	Plant competition	Important trees	Site index	
Abreu: AB	6f1	Slight	Slight	Moderate	Moderate	Douglas-fir White fir	48 ---	Douglas-fir.
Angostura: AG	7f1 3f1	Slight	Moderate	Moderate	Moderate	Engelmann spruce Quaking aspen	34 ---	---
AN	7f1 3f1	Slight	Moderate	Moderate	Moderate	Engelmann spruce Quaking aspen	34 ---	---
Bundo: BU, CY	6f1	Slight	Moderate	Moderate	Moderate	Douglas-fir White fir Engelmann spruce	51 --- ---	Douglas-fir.
Burnac: BY, FD	6o2	Slight	Slight	Moderate	Moderate	Douglas-fir White fir Ponderosa pine Engelmann spruce	44 --- --- ---	---
Cypher: AB, CY, MS	6d2	Moderate	Moderate	Severe	Moderate	Douglas-fir White fir Ponderosa pine	49 --- ---	---
Dargol: DO, FE	6o1	Slight	Moderate	Moderate	Moderate	Ponderosa pine Douglas-fir	49 ---	Ponderosa pine.
Etoe: EE: Etoe part	5r1	Slight	Moderate	Moderate	Moderate	Douglas-fir Ponderosa pine White fir	59 --- ---	Douglas-fir.
Etown part	5r1	Slight	Moderate	Moderate	Moderate	Douglas-fir Ponderosa pine White fir	59 --- ---	Douglas-fir.
Fuera: FD, FE	5r1	Slight	Moderate	Slight	Moderate	Douglas-fir Ponderosa pine	58 ---	Douglas-fir.
Ring: RG	6o1	Slight	Slight	Slight	Moderate	Ponderosa pine Douglas-fir	49 ---	Ponderosa pine.
Stout: DO	6d1	Moderate	Slight	Severe	Moderate	Ponderosa pine	51	---
Tolby: AN	7s1	Slight	Moderate	Moderate	Moderate	Engelmann spruce	26	Engelmann spruce.

[1] Ponderosa Pine Meyer, W.H. (7); Douglas-fir, Meyer, W.H. (7); Englemann Spruce, Brickell, J.E. (4).

Sprouting survival depends more on the crown density in the overstory than on the kind of soil. Periodic use of fire or clearcutting is necessary to sustain sprouting.

Logging slash should be severed and scattered on clearcuts to protect exposed soil and new sprouts.

Partial cutting in quaking aspen stands should be limited to the removal of not more than one-third of the basal area. At least 60 square feet of basal area per acre should be left to protect the windfirmness of the residual stand.

Precommercial thinning is not commonly practiced in stands of quaking aspen. To avoid volume loss from heart rot, which is common in mature stands, quaking aspen should normally be harvested near age 80.

WOODLAND SUITABILITY GROUP 5r1

In this group are soils of the Etoe, Etown, and Fuera series. These soils have the highest potential for wood crops in Colfax County. The average potential productivity for Douglas-fir and ponderosa pine is a low site class 5. The average site index for Douglas-fir is 59. The site index may be higher in localized areas where soil and moisture conditions are more favorable.

The soils are deep and well drained. They have a cobbly loam, gravelly loam, or loam surface layer. Runoff is medium to rapid. Permeability is slow to moderate. The content of rock fragments in the subsoil is greater than 35 percent. Available water capacity is 2 to 8 inches. Slopes range from 25 to 60 percent.

The principal species are ponderosa pine, Douglas-fir, and white fir. The common understory plants are Gambel oak, common chokecherry, kinnikinnick, buffaloberry, mountain maple, mountainmahogany, Thurber fescue, muttongrass, and Columbia needlegrass.

Management considerations are mainly for Douglas-fir and ponderosa pine. Douglas-fir is suggested for planting, but ponderosa pine also grows well.

Logging must be carefully planned. Equipment use and location, design, and construction of roads and skid trails should be considered because of the severe erosion hazard. The use of crawlers and rubber tired skidders should be limited to slopes of 30 percent or less. Roads must be seeded after logging to reduce runoff and curb erosion.

Young stands of Douglas-fir and white fir can be profitably managed for Christmas trees.

WOODLAND SUITABILITY GROUP 6d1

The only soil in this group is the Stout portion of Dargol-Stout-Vamer association, sloping. The potential for ponderosa pine is site class 6. The average site index for ponderosa pine is 51.

The soils are shallow and very shallow and well drained. They have a cobbly sandy loam surface layer. Runoff is slow. Permeability is rapid. The content of rock fragments is less than 35 percent. Available water capacity is 0.5 to 1.5 inches. Slopes are 1 to 9 percent.

The principal species are ponderosa pine and pinyon pine. The common understory plants are Gambel oak, mountainmahogany, mountain muhly, pine dropseed, and little bluestem.

Management considerations are for ponderosa pine. Tree planting is not generally suggested because 50 percent or more mortality can be expected because of shallow rooting depth and low available water capacity. Most areas of this soil are suited to conventional logging methods.

WOODLAND SUITABILITY GROUP 6d2

In this group are soils of the Cypher series. The potential productivity for Douglas-fir is a low site class 6. The average site index for Douglas-fir is 44.

The soils are shallow and well drained. They have a gravelly loam and gravelly sandy loam surface layer. Runoff is medium. Permeability is moderately rapid. The content of rock fragment in the substratum is greater than 35 percent. Available water capacity is 1 to 2 inches. Slopes are 10 to 50 percent.

The principal species are Douglas-fir, white fir, and ponderosa pine. The common understory plants are kinnikinnick, oregongrape, Arizona fescue, prairie junegrass, mountain muhly, and mountain brome.

Management considerations are for Douglas-fir because it is the most important species in the mixed conifer type.

Tree planting is not generally suggested because of the shallow rooting depth and very low available water capacity.

Because of the severe erosion hazard, special care is needed in road and skid trail construction and in logging to minimize soil disturbance.

WOODLAND SUITABILITY GROUP 6f1

In this group are soils of the Abreu and Bundo series. The potential productivity for Douglas-fir is a high site class 6. The average site index for Douglas-fir is 51.

The soils are deep and well drained. They have a gravelly loam or gravelly sandy loam surface layer. Runoff is medium. Permeability is moderately slow to moderately rapid. The content of rock fragments in the subsurface layer and subsoil is greater than 35 percent. Available water capacity is 3 to 7 inches. Slopes are 10 to 60 percent.

The principal species are Douglas-fir, white fir, and ponderosa pine. The common understory plants are Gambel oak, kinnikinnick, Arizona fescue, mountain muhly, and prairie junegrass.

Management considerations are for Douglas-fir or for ponderosa pine where it is more abundant. Douglas-fir is suggested for planting. Seedlings should receive nearly full sunlight for best survival and growth. Some site preparation may be needed before planting.

Special care must be taken on steeper slopes during road construction and logging to minimize soil disturbance. Use of crawlers and rubber tired skidders should be limited to slopes of less than 30 percent.

Pruning is desirable on final crops of Douglas-fir. Christmas tree production has good potential on these soils.

WOODLAND SUITABILITY GROUP 6o1

In this group are soils of the Dargol and Ring series. The potential productivity for ponderosa pine is site class 6. The average site index for ponderosa pine is 49.

The soils are moderately deep and deep and well drained. They have a stony loam or cobbly loam surface layer. Runoff is medium to rapid. Permeability is moderately slow to very slow. The content of rock fragments in the subsoil and substratum is more than 35

percent. The depth to sandstone bedrock is 20 to 40 inches. Available water capacity is 3 to 7 inches. Slopes are 0 to 30 percent.

The principal species are ponderosa pine and Douglas-fir. Common understory plants are Gambel oak, New Mexico locust, mountainmahogany, wildrose, buffaloberry, kinnikinnick, common chokecherry, Arizona fescue, pine dropseed, prairie junegrass, and mountain muhly.

Management considerations are for ponderosa pine. Ponderosa pine is suggested for planting. Some site preparation may be needed before planting.

Most areas are suited to conventional logging operations.

WOODLAND SUITABILITY GROUP 6o2

In this group are soils of the Burnac series. The potential productivity for Douglas-fir is a low site class 6. The average site index for Douglas-fir is 44.

The soils are deep and well drained. They have a stony loam surface layer. Runoff is medium. Permeability is very slow. The content of rock fragments is less than 35 percent. Available water capacity is 5 to 9 inches. Slopes are 1 to 25 percent.

The principal species are Douglas-fir, white fir, Engelmann spruce, and quaking aspen. Common understory plants are gooseberry, aster, Arizona fescue, and muttongrass.

Management considerations are for Douglas-fir. Douglas-fir is suggested for planting. Some site preparation may be needed before planting. Douglas-fir seedlings need nearly full sunlight for best survival and growth.

Most areas are suited to conventional logging methods.

WOODLAND SUITABILITY GROUP 7f1

In this group are soils of the Angostura series. These soils have the highest production potential for Engelmann spruce in Colfax County. The average potential productivity for Engelmann spruce is a high site class 7 using a base age of 50 years. Average site index for Engelmann spruce is 34.

The soils are deep and well drained. They have a stony loam, stony fine sandy loam, or stony sandy loam surface layer. Runoff is medium. Permeability is moderate. The content of rock fragments in the subsoil is greater than 35 percent. Available water capacity in the profile is 2 to 6 inches. Slopes are 20 to 60 percent.

The principal species are Engelmann spruce, subalpine fir, and quaking aspen. Common understory plants are kinnikinnick, whortleberry, tall oatgrass, and pine dropseed.

Management considerations are for Engelmann spruce. Young stands of Engelmann spruce are highly responsive to management and the release cuttings in dense stands often triple the growth rate.

Natural reproduction of Engelmann spruce seedlings is usually adequate. Planting may be required on clearcuts that lack advanced reproduction. Site preparation is generally necessary before planting seedlings on clearcut areas. Seedling survival is best on north and east aspects.

Engelmann spruce is often suppressed by an overstory of quaking aspen. Where the Engelmann spruce are sapling size, the quaking aspen overstory should be carefully and completely removed in a single cut to release the Engelmann spruce. It is preferable to leave about 60 square feet of basal area per acre of the quaking aspen understory where the Engelmann spruce understory is seedling size. This suppresses the vigor of the quaking aspen suckers that might otherwise outgrow and seriously inhibit the growth of the conifers.

Surface rock and excessive slope are the major limitations for equipment use. Equipment use must be limited to roads and planned skid trails on operable slopes to protect advanced reproduction.

Logging slash in clearcuts should be windrowed on the contour or stacked in small piles and burned under favorable conditions.

Clearcut boundaries should be designed to blend into the surrounding landscape and to avoid sharp corners. They should be located from about 200 feet, ridgetops and canyon bottoms. In partial cutting of Engelmann spruce, especially in single-storied stands, no more than one-third of the basal area should be removed at one time. This serves to protect the windfirmness of the residual stand.

Precommercial thinning has not been widely practiced in the spruce-fir type. The pruning of final crop trees is suggested only on the highest quality sites. Harvesting and management systems for the spruce-fir type are complex. An experienced forester should design management practices for the specific area in question.

WOODLAND SUITABILITY GROUP 7x1

In this group are soils of the Tolby series. The average potential productivity of this soil for Engelmann spruce is a low site class 7 using a base age of 50 years. The average site index for Engelmann spruce is 26.

This soil is deep and excessively drained. It has a stony loam surface layer. Runoff is medium. Permeability is rapid. The content of rock fragments in the subsoil and substratum is greater than 35 percent. Available water capacity is 3 to 5 inches. Slopes are 25 to 60 percent.

The principal species are Engelmann spruce and subalpine fir. Common understory plants are kinnikinnick, dwarf serviceberry, Arizona fescue, mountain muhly, and muttongrass.

Management considerations are for Engelmann spruce. Young stands of Engelmann spruce are responsive to management. Release cuttings in dense stands often will double the growth rate.

Natural reproduction of Engelmann spruce seedlings is generally adequate. Planting may be required on clearcuts that lack advanced reproduction. Site preparation is usually necessary before planting seedlings on clearcut areas. Seedling survival is best on north and east aspects.

Equipment use must be limited to roads and planned skid trails on operable slopes to protect advanced reproduction. Because of the high erosion hazard, special care must be taken during road construction and logging to minimize soil disturbance. Use of crawlers and rubber tired skidders should be limited to slopes of less than 30 percent.

Logging slash in clearcuts should be windrowed on

the contour or stacked in small piles and burned under favorable conditions.

Clearcut boundaries should be designed to blend into the surrounding landscape and to avoid sharp corners. They should be located away from ridgetops and canyon bottoms. In partial cutting of Engelmann spruce, especially in single-storied stands, no more than one-third of the basal area should be removed at one time to protect the windfirmness of the residual stand.

Harvesting and management systems for the spruce-fir type are complex. An experienced forester should design management practices for the specific area in question.

Windbreaks [6]

The part of Colfax County lying east and south of a line extending through Miami and Raton, plus the Moreno Valley, is the primary area of consideration in this section. Native cover is predominantly grass. There are some areas of pinyon pine, one-seed juniper, and ponderosa pine that have little or no commercial value, but that provide some protection for livestock during winter blizzards.

Windbreaks planted for either home or livestock protection return substantial benefits to landowners. They reduce the cost of heating homes by diverting cold wintry winds. They control drifting snow and protect livestock. They provide summer shade, enhance the beauty of a home and its surroundings, and provide food and cover for wildlife and a habitat for birds (*11*).

Great care is needed in selecting locations for windbreak plantings and in establishing them. Evergreens are the most desirable trees for planting because they are long lived and resist damage by wind, snow, and disease. They are especially beneficial in this area because they provide protection from spring winds, which occur before the deciduous trees leaf out. Evergreens grow much more slowly than deciduous trees and shrubs for the first few years, and therefore, should be planted in rows separate from the faster growing but short-lived broadleaf trees. The use of 1- or 2-year-old plants grown in pots significantly increases survival rates, especially for evergreens.

Assistance in planning windbreaks and recommendations for species used in irrigated windbreaks are available through the local office of the Soil Conservation Service or the New Mexico Department of State Forestry.

Care and management of trees.—The species of trees and shrubs common to the county are limited by climatic conditions and need to be selected carefully. Timely cultivation is important to reduce the hazard of destructive fires and the competition from weeds and grass for survival and proper growth.

Trees lost during the first year should be replaced as soon as possible to ensure the development of a continuous, uniform wind barrier. Pruning should be limited to the removal of dead branches. Removing lower branches does not stimulate height growth and reduces the density and effectiveness of the barrier.

Newly planted trees need protection from livestock, and fencing is needed if animals graze nearby. Rabbits, mice, deer, and antelope may also damage the trees.

Providing supplemental water to newly planted trees is beneficial and increases survival. Adequate water should be supplied during the first year so that plants can develop a good root system.

Soils in Colfax County are in four windbreak groups based on soil properties. The soils within each group are suitable for establishment of similar species, and trees respond much the same to management practices on all soils within the group. Forested soils that are used for woodland and soils with marginal windbreaks established are not considered in this section.

[6] CARY W. HULL, forester, Soil Conservation Service, helped prepare this section.

WINDBREAK GROUP 1

In this group are deep, well drained soils of the Berthoud, Capulin, Colmor, Dalhart, Dallam, Deacon, Dioxice, Gruver, Manzano, and Texline series. The surface layer is a fine sandy loam, loam, silt loam, or silty clay loam. Slopes are 0 to 9 percent. Permeability is moderate to moderately slow. Available water capacity is 8 to 13 inches. The elevation is 5,800 to 8,000 feet. The average annual soil temperature is 47° to 53° F.

If supplemental water is provided during establishment—

Oriental arborvitae has good vigor, has about 90 percent survival, and grows about 12 to 14 feet in 20 years.

Rocky Mountain juniper has good vigor, has about 80 percent survival, and grows about 14 feet in 20 years.

Ponderosa pine has fair vigor, has about 70 percent survival, and grows about 16 to 18 feet in 20 years.

Russian-olive has fair vigor, has about 60 percent survival, and grows about 16 to 20 feet in 20 years.

Siberian elm has fair vigor, has about 80 percent survival, and grows about 20 to 25 feet in 20 years.

WINDBREAK GROUP 2

In this group are moderately deep to deep, mainly well drained soils of the Carnero, La Brier, Litle, Mughouse, Patri, Swastika, Thunderbird, Torreon, Tricon, and Vermejo series. Some of the La Brier and Swastika soils are saline. Vermejo soils are saline below 20 inches and may have a saline surface layer. They are moderately well drained. The surface layer is a loam, silt loam, clay loam, silty clay loam, stony sandy clay loam, or stony silt loam. Slopes range from 0 to 15 percent, but in most areas are 0 to 5 percent. Elevation is 5,800 to 7,600 feet. Permeability is slow to very slow. Available water capacity in the profile ranges from 2 to 12 inches but is mainly 5 to 12 inches. The average annual soil temperature is 47° to 55° F.

If supplemental water is provided during establishment—

Oriental arborvitae has good vigor, has about 90 percent survival, and grows about 12 feet in 20 years.

Rocky Mountain juniper has good vigor, has about 100 percent survival, and grows about 12 feet in 20 years.

Ponderosa pine has good vigor, has about 90 percent survival, and grows about 18 feet in 20 years.

Russian-olive has fair vigor, has about 85 percent survival, and grows about 12 feet in 20 years.

Siberian elm has good vigor, has about 100 percent survival, and grows about 36 feet in 20 years.

WINDBREAK GROUP 3

In this group are deep, well drained soils of the Ayon, Seelez, and Tinaja series. The surface layer is fine sandy loam, stony silt loam, or gravelly and very gravelly sandy clay loam. Slopes range from 0 to 25 percent, but are generally between 1 and 9 percent. Permeability is moderate to rapid. Available water capacity in the profile is 2 to 9 inches. The elevation is 5,800 to 7,500 feet. The average annual temperature is 47° to 53° F.

If supplemental water is provided during establishment—

Oriental arborvitae has good vigor, has about 80 percent survival, and grows about 10 to 12 feet in 20 years.

Rocky Mountain juniper has fair vigor, has about 90 percent survival, and grows about 12 feet in 20 years.

Ponderosa pine has good vigor, has about 80 percent survival, and grows about 20 to 22 feet in 20 years.

Russian-olive has good vigor, has about 75 percent survival, and grows about 15 to 20 feet in 20 years.

Siberian elm has good vigor, has about 85 percent survival, and grows 22 to 26 feet in 20 years.

WINDBREAK GROUP 4

In this group are very shallow and shallow, well drained soils of the Apache, Bernal, Laporte, Penrose, Plack, and Travessilla series. The surface layer is fine sandy loam, loam, silt loam, channery loam, or cobbly loam. Slopes are 0 to 30 percent. Permeability is moderately rapid. Available water capacity in the profile is 1 to 4 inches. The elevation is 5,500 to 8,000 feet. The average annual soil temperature is 47° to 55° F. Soils less than 10 inches deep are not suitable for windbreak plantings.

If supplemental water is provided during establishment—

Oriental arborvitae has good vigor, has about 50 percent survival, and grows about 8 feet in 20 years.

Rocky Mountain juniper has fair vigor, has about 50 percent survival, and grows about 8 feet in 20 years.

Russian-olive has fair vigor, has about 50 percent survival, and grows about 12 feet in 20 years.

Siberian elm has fair vigor, has about 50 percent survival, and grows about 16 feet in 20 years.

Engineering[7]

This section provides information about the use of soils for building sites, sanitary facilities, construction materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in tables in this section are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations were also considered.

Based on the information assembled about soil properties, ranges of values may be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values may be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to—(1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternate sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravey, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 4 shows, for each kind of soil, ratings of the degree and kind of limitations for building site development; table 5, for sanitary facilities; and table 7, for water management. Table 6 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil

[7] CHARLES M. CARUSO and CHARLES K. DAVIS, civil engineers, Soil Conservation Service, helped prepare this section.

map, the soil descriptions, and other data provided in this survey can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have different meanings in soil science and in engineering; the Glossary defines many of these terms.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 4. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal water table, the texture and consistence of soils, the tendency of soils to cave in or slough, and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 4 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation do no occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and the large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table 4 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO and Unified classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavation, were also considered.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that deal with the ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 5 shows the degree and kind of limitations of each soil for these uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is indicated by the rating *slight,* soils are favorable for the specified use and limitations are minor and easily overcome; if *moderate,* soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe,* soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that effect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it may be possible to install special systems that lower the sea-

TABLE 4.—*Building site development*

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Abreu:					
[1] AB:					
Abreu part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Angostura:					
[1] AG	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
[1] AN:					
Angostura part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Tolby part	Severe: slope, large stones, cutbanks cave.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Apache:					
[1] ApD:					
Apache part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Ayon part	Severe: small stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: frost action, low strength.
Aridic Argiustolls:					
[1] ARF, [1] ARG:					
Aridic Argiustolls part.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Rock outcrop part.					
Bandera:					
[1] BA:					
Bandera part	Severe: cutbanks cave, slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Cinder land part.					
Barela:					
[1] BE:					
Barela part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Yankee part	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Berthoud:					
BhD	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
Brycan:					
[1] BR:					
Brycan part	Slight	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.	Moderate: low strength, frost action, shrink-swell.
Brycan part	Slight	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, slope.	Moderate: low strength, frost action, shrink-swell.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Bundo:					
[1] BU	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Burnac:					
[1] BY:					
Burnac part	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Hillery part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength.
Capulin:					
[1] CaD:					
Capulin part	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
Ayon part	Severe: small stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones, slope.	Moderate: frost action, low strength.
[1] CB:					
Capulin part	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
Torreon part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Carnero:					
[1] CP:					
Carnero part	Severe: depth to rock.	Severe: shrink-swell, low strength.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: shrink-swell, low strength.
Partri part	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Dioxice part	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Colmor:					
CrB, CsB	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
CrC, CsC	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: low strength.
[1] CT	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
[1] CV:					
Colmor part	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: low strength.
Vermejo part	Severe: too clayey.	Severe: low strength, shrink-swell, floods.	Severe: low strength, shrink-swell, floods.	Severe: shrink-swell, low strength, floods.	Severe: shrink-swell, low strength.
Litle part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Cypher:					
[1] CY:					
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Bundo part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Dalhart:					
DaB, DaC	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action, shrink-swell.
[1] DB:					
Dalhart part	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, frost action, shrink-swell.
Seelez part	Moderate: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.
Dallam:					
DmB, DmC2, DnB, DnB2	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell, frost action.
Dargol:					
[1] DO:					
Dargol part	Severe: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength.
Stout part	Severe: depth to rock, small stones.	Severe: depth to rock, small stones.	Severe: depth to rock, small stones.	Severe: depth to rock, small stones.	Severe: depth to rock.
Vamer part	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell.	Severe: depth to rock.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell, low strength.
Deacon:					
[1] DP:					
Deacon part	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
Ayon part	Severe: small stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones, slope.	Moderate: frost action, low strength.
[1] DR:					
Deacon part	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
La Brier part	Moderate: too clayey, floods.	Severe: low strength, shrink-swell, floods.	Severe: low strength, shrink-swell, floods.	Severe: low strength, shrink-swell, floods.	Severe: low strength, shrink-swell.
Manzano part	Moderate: floods	Severe: floods	Severe: floods	Severe: floods	Moderate: floods, shrink-swell, frost action.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
[1] DsE:					
Deacon part	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
Oro Grande part	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.
Laporte part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Des Moines: [1] DT	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones, low strength.
Dioxice: DxC, DxC2	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Etoe: [1] EE:					
Etoe part	Severe: slope, small stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Etown part	Severe: slope, large stones.	Severe: slope, large stones, shrink-swell.	Severe: slope, large stones, shrink-swell.	Severe: slope, large stones, shrink-swell.	Severe: slope, shrink-swell.
Frolic: [1] FC:					
Frolic part	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: floods.
[1] FC: Cumulic Haplaquolls part.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Fuera: [1] FD:					
Fuera part	Severe: slope, too clayey.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, slope, low strength.	Severe: low strength, shrink-swell, slope.
Burnac part	Severe: slope, too clayey.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell, slope.
[1] FE:					
Fuera part	Severe: slope, too clayey.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, slope, low strength.	Severe: low strength, shrink-swell, slope.
Dargol part	Severe: slope, too clayey, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, low strength.
Vamer part	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: depth to rock, shrink-swell, low strength.
Gruver: GaB, GbB, GcB2	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hillery:					
HrD	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
La Brier:					
Lb	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Lc	Severe: too clayey.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: shrink-swell, low strength.
[1] Lr:					
La Brier part	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Rock outcrop part.					
Laporte:					
LSF	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Litle:					
LtB	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Manzano:					
Ma, [1] MB	Moderate: floods	Severe: floods	Severe: floods	Severe: floods	Moderate: floods, shrink-swell, frost action.
Midnight:					
[1] Mn:					
Midnight part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rombo part	Severe: slope, too clayey, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
Rock outcrop part.					
Mion:					
MoB	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell, corrosive.	Severe: low strength, shrink-swell, depth to rock.
[1] Mp:					
Mion part	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, low strength, depth to rock.
Rock outcrop part.					
[1] MR:					
Mion part	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell.	Severe: low strength, shrink-swell, depth to rock.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Litle part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Moreno:					
[1] MS:					
Moreno part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Morval:					
[1] MT:					
Morval part	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell, frost action.
Moreno part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Mughouse:					
[1] Mu:					
Mughouse part	Severe: depth to rock, large stones.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Severe: low strength.
[1] Mu:					
Swastika part	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Oro Grande:					
[1] OG:					
Oro Grande part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.
Meloche part	Severe: slope, too clayey, large stones.	Severe: slope, shrink-swell, large stones.	Severe: slope, shrink-swell, large stones.	Severe: slope, shrink-swell, large stones.	Severe: slope, shrink-swell, low strength.
[1] OT:					
Oro Grande part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.
Tafoya part	Severe: slope, too clayey, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Penrose:					
PE	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Plack:					
PL	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
Ponil:					
[1] PV:					
Ponil part	Severe: slope, large stones, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
Vamer part	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: depth to rock, shrink-swell, low strength.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Raton:					
[1] Ra:					
Raton part	Severe: too clayey, depth to rock, large stones.	Severe: shrink-swell, large stones, depth to rock.	Severe: shrink-swell, large stones, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, large stones.
Barela part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
[1] RD:					
Raton part	Severe: slope, depth to rock, large stones.	Severe: slope, shrink-swell, large stones.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, depth to rock, shrink-swell.
Dalcan part	Severe: depth to rock, small stones.	Moderate: low strength.	Severe: depth to rock.	Severe: depth to rock.	Severe: low strength.
[1] RE:					
Raton part	Severe: slope, depth to rock, large stones.	Severe: slope, shrink-swell, large stones.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, depth to rock, shrink-swell.
Wellsville part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Ring:					
[1] RG:					
Ring part	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, frost action.
Brycan part	Slight	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.	Moderate: low strength, frost action, shrink-swell.
Riverwash:					
RV					
[1] Rz:					
Riverwash part					
Manzano part	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: floods.
Saladon:					
SaC	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, low strength.
Seelez:					
SeB, SfC, SnA	Moderate: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.
Swastika:					
SoA, SpD, SsB, St, [1] SW	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
[1] SX:					
Swastika part	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
La Brier part	Severe: too clayey.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: shrink-swell, low strength.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Texline:					
TED	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Thunderbird:					
[1] TH:					
Thunderbird part.	Severe: depth to rock, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, depth to rock, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Torreon part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Tinaja:					
TNE	Moderate: small stones, slope.	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope.
Torreon:					
[1] TO:					
Torreon part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Deacon part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
Travessilla:					
[1] Tr:					
Travessilla part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Rock outcrop part.					
[1] TS:					
Travessilla part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Bernal part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, low strength.
Rock outcrop part.					
Tricon:					
[1] TX:					
Tricon part	Severe: cemented pan.	Severe: shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Plack part	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
Ustochrepts:					
[1] US:					
Ustochrepts part.	Severe: slope, large stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Rock outcrop part.					
Vermejo:					
Ve, Vm	Severe: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.

TABLE 4.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
[1] Vs2:					
Vermejo part	Severe: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Swastika part	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Wellsville:					
WEG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

sonal water table or to increase the size of the absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor surrounded by cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil at least 4 feet thick for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that are very high in organic matter and those that have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the location of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste, either in excavated trenches or on the surface of the soil. The waste is spread compacted in layers and covered with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling the trenches. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 5 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for sanitary landfills should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

In addition to these features, the soils selected for final cover of landfills should be suitable for growing plants. In comparison with other horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of road fill, sand, gravel, and topsoil is indicated in table 6 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Road fill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been compacted and adequately drained. The performance of soil after it is

TABLE 5.—*Sanitary facilities*

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Abreu:					
[1] AB:					
Abreu part	Severe: percs slowly, depth to rock, slope.	Severe: slope	Severe: depth to rock.	Severe: slope	Poor: slope, small stones.
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Angostura:					
[1] AG	Severe: slope, large stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope	Poor: slope, large stones, area reclaim.
[1] AN:					
Angostura part	Severe: slope, large stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones.	Severe: slope	Poor: slope, large stones, area reclaim.
Tolby part	Severe: slope, large stones.	Severe: slope, seepage, large stones.	Severe: slope, seepage, large stones.	Severe: slope, seepage.	Poor: slope, large stones, small stones.
Apache:					
[1] ApD:					
Apache part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Ayon part	Moderate: large stones.	Severe: large stones.	Moderate: large stones.	Slight	Poor: small stones.
Aridic Argiustolls:					
[1] ARF, [1] ARG:					
Aridic Argiustolls part.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Rock outcrop part.					
Bandera:					
[1] BA:					
Bandera part	Severe: slope	Severe: seepage, slope.	Severe: seepage, slope, small stones.	Severe: seepage, slope.	Poor: slope, small stones.
Cinder land part.					
Barela:					
[1] BE:					
Barela part	Severe: depth to rock, percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey, large stones, area reclaim.
Yankee part	Severe: percs slowly.	Moderate: slope	Severe: too clayey.	Slight	Poor: too clayey.
Berthoud:					
BhD	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Brycan:					
[1] BR:					
Brycan part	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Good.

TABLE 5.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Brycan part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Good.
Bundo:					
[1] BU	Severe: slope	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.
Burnac:					
[1] BY:					
Burnac part	Severe: percs slowly.	Severe: large stones, slope.	Severe: depth to rock, large stones, too clayey.	Moderate: slope	Poor: large stones, too clayey.
Hillery part	Severe: percs slowly, depth to rock.	Severe: slope	Severe: too clayey, depth to rock.	Moderate: slope	Poor: thin layer.
Capulin:					
[1] CaD:					
Capulin part	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: thin layer.
Ayon part	Moderate: large stones.	Severe: large stones.	Moderate: large stones.	Slight	Poor: small stones.
[1] CB:					
Capulin part	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: thin layer.
Torreon part	Severe: percs slowly.	Moderate: slope	Severe: too clayey.	Slight	Poor: too clayey.
Carnero:					
[1] CP:					
Carnero part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey, area reclaim.
Partri part	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Poor: too clayey, thin layer.
Dioxice part	Severe: percs slowly.	Moderate: slope	Slight	Slight	Fair: too clayey.
Colmor:					
CrB, CrC, CsB, CsC, [1] CT	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.
[1] CV:					
Colmor part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.
Vermejo part	Severe: percs slowly.	Moderate: slope	Severe: too clayey.	Slight	Poor: too clayey.
Litle part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey.
Cypher:					
[1] CY:					
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Bundo part	Severe: slope	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.

TABLE 5.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Dalhart:					
DaB, DaC	Slight	Severe: seepage, slope.	Severe: seepage	Severe: seepage	Good.
[1] DB:					
Dalhart part	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good.
Seelez part	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good.
Dallam:					
DmB, DnB, DnB2	Slight	Moderate: seepage.	Slight	Slight	Good.
DmC2	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Dargol:					
[1] DO:					
Dargol part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight	Poor: thin layer, too clayey, area reclaim.
Stout part	Severe: depth to rock, small stones.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage, small stones.	Severe: seepage	Poor: thin layer, small stones, area reclaim.
Vamer part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: thin layer, area reclaim.
Deacon:					
[1] DP:					
Deacon part	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Ayon part	Moderate: large stones.	Severe: large stones.	Moderate: large stones.	Slight	Poor: small stones.
[1] DR:					
Deacon part	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
La Brier part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
Manzano part	Severe: percs slowly.	Severe: floods	Moderate: floods	Moderate: floods	Fair: too clayey.
[1] DsE:					
Deacon part	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Oro Grande part	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.	Moderate: slope	Poor: thin layer, large stones, area reclaim.
Laporte part	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope	Poor: thin layer, area reclaim.
Des Moines:					
[1] DT	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones, depth to rock, slope.	Severe: slope	Poor: slope, large stones, area reclaim.

TABLE 5.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Dioxice: DxC, DxC2	Severe: percs slowly.	Moderate: slope	Slight	Slight	Fair: too clayey.
Etoe: [1] EE: Etoe part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope, small stones, area reclaim.
Etown part	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: slope, large stones, too clayey.	Severe: slope	Poor: slope, large stones, area reclaim.
Frolic: [1] FC: Frolic part	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Cumulic Haplaquolls part.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Fuera: [1] FD: Fuera part	Severe: percs slowly, slope.	Severe: slope	Severe: slope, too clayey.	Severe: slope	Poor: slope, too clayey.
Burnac part	Severe: percs slowly, slope.	Severe: large stones, slope.	Severe: depth to rock, large stones, too clayey.	Severe: slope	Poor: large stones, too clayey.
[1] FE: Fuera part	Severe: percs slowly, slope.	Severe: slope	Severe: slope, too clayey.	Severe: slope	Poor: slope, too clayey.
Dargol part	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope	Poor: slope, thin layer, area reclaim.
Vamer part	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope	Poor: thin layer, area reclaim.
Gruver: GaB, GbB, GcB2	Moderate: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
Hillery: HrD	Severe: percs slowly, depth to rock.	Moderate: slope, large stones, depth to rock.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
La Brier: Lb	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
Lc	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Moderate: floods	Poor: too clayey, hard to pack.
[1] Lr: La Brier part	Severe: percs slowly.	Severe: floods	Moderate: too clayey.	Moderate: floods	Fair: hard to pack, too clayey.
Rock outcrop part.					
Laporte: LSF	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope	Poor: thin layer, slope, area reclaim.

TABLE 5.—*Sanitary facilities—Continued*

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Litle:					
LtB	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey.
Manzano:					
Ma, [1] MB	Severe: percs slowly.	Severe: floods	Moderate: floods	Moderate: floods	Fair: too clayey.
Midnight:					
[1] Mn:					
Midnight part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, thin layer, area reclaim.
Rombo part	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope	Poor: slope, area reclaim.
Rock outcrop part.					
Mion:					
MoB	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Severe: thin layer, area reclaim, too clayey.
[1] Mp:					
Mion part	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope	Severe: slope, thin layer, too clayey.
Rock outcrop part.					
[1] MR:					
Mion part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: thin layer, area reclaim, too clayey.
Litle part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey.
Moreno:					
[1] MS:					
Moreno part	Severe: percs slowly.	Severe: slope	Severe: too clayey.	Moderate: slope	Fair: slope, too clayey.
Cypher part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Morval:					
[1] MT:					
Morval part	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Moreno part	Severe: percs slowly.	Severe: slope	Severe: too clayey.	Moderate: slope	Fair: slope.
Mughouse:					
[1] Mu:					
Mughouse part	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope	Poor: area reclaim, too clayey.
Swastika part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.

TABLE 5.—*Sanitary facilities—Continued*

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Oro Grande:					
[1] OG:					
Oro Grande part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope	Poor: slope, thin layer, large stones.
Meloche part	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: slope, too clayey, depth to rock.	Severe: slope	Poor: too clayey, slope, large stones.
[1] OT:					
Oro Grande part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope	Poor: slope, thin layer, large stones.
Tafoya part	Severe: slope, percs slowly, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope	Poor: slope, area reclaim, large stones.
Penrose:					
PE	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Plack:					
PL	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Ponil:					
[1] PV:					
Ponil part	Severe: slope, percs slowly, depth to rock.	Severe: slope	Severe: too clayey, large stones, depth to rock.	Severe: slope	Poor: slope, too clayey, hard to pack.
Vamer part	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope	Poor: thin layer, area reclaim, too clayey.
Raton:					
[1] Ra:					
Raton part	Severe: percs slowly, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: too clayey, depth to rock, large stones.	Moderate: slope	Poor: thin layer, large stones.
Barela part	Severe: depth to rock, percs slowly.	Moderate: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Slight	Poor: thin layer.
[1] RD:					
Raton part	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: too clayey, depth to rock, large stones.	Severe: slope	Poor: slope, thin layer, large stones.
Dalcan part	Severe: percs slowly, depth to rock.	Severe: depth to rock, small stones.	Severe: depth to rock.	Slight	Poor: small stones.
[1] RE:					
Raton part	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: too clayey, depth to rock, large stones.	Severe: slope	Poor: slope, thin layer, large stones.
Wellsville part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Ring:					
[1] RG:					
Ring part	Severe: percs slowly.	Moderate: small stones, slope.	Slight	Slight	Fair: large stones, small stones.

TABLE 5.—*Sanitary facilities—Continued*

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Brycan part	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Good.
Riverwash: RV					
[1] Rz: Riverwash part					
Manzano part	Severe: percs slowly, floods.	Severe: floods	Severe: floods	Severe: floods	Fair: too clayey.
Saladon: SaC	Severe: floods, percs slowly, wetness.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, wetness.
Seelez: SeB, SfC, SnA	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good.
Swastika: SoA, St	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
SpD, SsB, [1] SW	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.
[1] SX: Swastika part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.
La Brier part	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Moderate: floods	Poor: too clayey, hard to pack.
Texline: TED	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Thunderbird: [1] TH: Thunderbird part.	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: too clayey, area reclaim.
Torreon part	Severe: percs slowly.	Moderate: slope	Severe: too clayey.	Slight	Poor: too clayey.
Tinaja: TNE	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: seepage, small stones.	Moderate: slope	Poor: small stones.
Torreon: [1] TO: Torreon part	Severe: percs slowly.	Moderate: slope	Severe: too clayey.	Slight	Poor: too clayey.
Deacon part	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Travessilla: [1] Tr: Travessilla part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope	Poor: slope, thin layer, area reclaim.
Rock outcrop part.					

TABLE 5.—*Sanitary facilities—Continued*

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1] TS:					
Travessilla part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope	Poor: slope, thin layer, area reclaim.
Bernal part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Rock outcrop part.					
Tricon:					
[1] TX:					
Tricon part	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: area reclaim, thin layer, too clayey.
Plack part	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Ustochrepts:					
[1] US:					
Ustochrepts part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Rock outcrop part.					
Vermejo:					
Ve, Vm	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Moderate: floods	Poor: too clayey.
[1] Vs2:					
Vermejo part	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Moderate: floods	Poor: too clayey.
Swastika part	Severe: percs slowly.	Moderate: slope	Moderate: too clayey.	Slight	Fair: too clayey.
Wellsville:					
WEG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

stabilized with lime or cement is not considered in the ratings, but information about soil properties that determine such performance is given in the descriptions of soil series.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within the profile. The estimated engineering properties in table 6 provide more specific information about the nature of each horizon that can help determine its suitability for road fill.

Soils rated *good* have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*, regardless of the quality of the suitable material.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 6 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of min-

TABLE 6.—*Construction material*

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Abreu:				
[1] AB:				
Abreu part	Fair: frost action, slope	Unsuited	Unsuited	Poor: slope, small stones.
Cypher part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer:	Poor: slope, small stones, area reclaim.
Angostura:				
[1] AG	Poor: slope, large stones, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
[1] AN:				
Angostura part	Poor: slope, large stones, area reclaim.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Tolby part	Poor: slope, large stones, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones, small stones.
Apache:				
[1] ApD:				
Apache part	Poor: thin layer, low strength.	Unsuited	Unsuited	Poor: small stones, area reclaim.
Ayon part	Fair: frost action, large stones.	Unsuited	Unsuited: large stones.	Poor: small stones, large stones.
Aridic Argiustolls:				
[1] ARF, [1] ARG:				
Aridic Argiustolls part	Poor: slope			Poor: slope.
Rock outcrop part	Poor: slope			
Bandera:				
[1] BA:				
Bandera part	Poor: slope	Unsuited	Good	Poor: slope, small stones.
Cinder land part				
Barela:				
[1] BE:				
Barela part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Barela part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: large stones.
Yankee part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Berthoud:				
BhD	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Brycan:				
[1] BR	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Bundo:				
[1] BU	Poor: slope, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones, area reclaim.
Burnac:				
[1] BY:				
Burnac part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: large stones.
Hillery part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: slope.

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Capulin:				
[1] CaD:				
Capulin part	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
Ayon part	Fair: frost action, large stones.	Unsuited	Unsuited: large stones.	Poor: small stones, large stones.
[1] CB:				
Capulin part	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
Torreon part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Carnero:				
[1] CP:				
Carnero part	Poor: shrink-swell, thin layer, low strength.	Unsuited	Unsuited	Fair: too clayey.
Partri part	Poor: shrink-swell	Unsuited	Unsuited	Fair: too clayey.
Dioxice part	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
Colmor:				
CrB, CrC, CsB, CsC, [1] CT	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
[1] CV:				
Colmor part	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
Vermejo part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, excess salt.
Litle part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Cypher:				
[1] CY:				
Cypher part	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, small stones, area reclaim.
Bundo part	Poor: slope, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones, area reclaim.
Dalhart:				
DaB, DaC	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
[1] DB:				
Dalhart part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Seelez part	Fair: frost action, area reclaim.	Poor: excess fines.	Unsuited	Good.
Dallam:				
DmB, DmC2	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Poor: too sandy.
DnB, DnB2	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Dargol:				
[1] DO:				
Dargol part	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: large stones, area reclaim.
Stout part	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: thin layer, small stones, area reclaim.
Vamer part	Poor: thin layer, shrink-swell, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim.

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Deacon:				
[1] DP:				
Deacon part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Good.
Ayon part	Fair: low strength, frost action.	Unsuited	Unsuited	Poor: small stones.
[1] DR:				
Deacon part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Good.
La Brier part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Manzano part	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: too clayey.
[1] DsE:				
Deacon part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Good.
Oro Grande part	Poor: thin layer, large stones, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: large stones, small stones, thin layer.
Laporte part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: small stones, area reclaim, thin layer.
Des Moines:				
[1] DT:	Poor: thin layer, slope, large stones.	Unsuited	Unsuited	Poor: slope, small stones, large stones.
Dioxice:				
DxC, DxC2	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
Etoe:				
[1] EE:				
Etoe part	Poor: slope, area reclaim.	Unsuited	Unsuited	Poor: slope, small stones, area reclaim.
Etown part	Poor: slope, area reclaim.	Unsuited	Unsuited	Poor: slope, small stones.
Frolic:				
[1] FC:				
Frolic part	Poor: frost action, low strength.	Unsuited	Unsuited	Good.
Cumulic Haplaquolls part.	Poor: wetness	Unsuited	Unsuited	Poor: wetness.
Fuera:				
[1] FD:				
Fuera part	Poor: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: slope, small stones.
Burnac part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: large stones, slope.
[1] FE:				
Fuera part	Poor: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: slope, small stones.
Dargol part	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, area reclaim.
Vamer part	Poor: thin layer, shrink-swell, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Gruver:				
GaB, GbB, GcB2	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hillery:				
HrD	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: large stones.
La Brier:				
Lb	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Lc	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: excess salt, too clayey.
[1] Lr:				
La Brier part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Rock outcrop part				
Laporte:				
LSF	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: small stones, slope, thin layer.
Litle:				
LtB	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Manzano:				
Ma, [1] MB	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: too clayey.
Midnight:				
[1] Mn:				
Midnight part	Poor: slope, area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, thin layer.
Rombo part	Poor: slope, thin layer, low strength.	Unsuited	Unsuited	Poor: slope, area reclaim, small stones.
Rock outcrop part				
Mion:				
MoB	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
[1] Mp:				
Mion part	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, thin layer, area reclaim.
Rock outcrop part				
[1] MR:				
Mion part	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Litle part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey, area reclaim.
Moreno:				
[1] MS:				
Moreno part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: slope, too clayey.
Cypher part	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, small stones, area reclaim.
Morval:				
[1] MT:				
Morval part	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: too clayey.
Moreno part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: slope, too clayey.

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Mughouse:				
[1] Mu:				
Mughouse part	Poor: thin layer, low strength, area reclaim.	Unsuited	Unsuited	Poor: area reclaim, large stones.
Swastika part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Oro Grande:				
[1] OG:				
Oro Grande part	Poor: slope, thin layer, large stones.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.
Meloche part	Poor: slope, low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, large stones.
[1] OT:				
Oro Grande part	Poor: slope, thin layer, large stones.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.
Tafoya part	Poor: slope, large stones	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Penrose:				
PE	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: area reclaim, thin layer.
Plack:				
PL	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Ponil:				
[1] PV:				
Ponil part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, large stones, too clayey.
Vamer part	Poor: thin layer, shrink-swell, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Raton:				
[1] Ra:				
Raton part	Poor: large stones, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: large stones, area reclaim, thin layer.
Barela part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: large stones.
[1] RD:				
Raton part	Poor: large stones, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, area reclaim.
Dalcan part	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: small stones, too clayey.
[1] RE:				
Raton part	Poor: large stones, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, area reclaim.
Wellsville part	Poor: slope	Unsuited	Unsuited	Poor: small stones, slope.
Ring:				
[1] RG:				
Ring part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Poor: large stones, small stones.
Brycan part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Riverwash:				
RV				

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1] Rz:				
Riverwash part				
Manzano part	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: too clayey.
Saladon:				
SaC	Poor: low strength, shrink-swell, wetness.	Unsuited	Unsuited	Poor: too clayey, wetness.
Seelez:				
SeB, SfC, SnA	Fair: frost action, area reclaim.	Poor: excess fines.	Unsuited	Good.
Swastika:				
SoA, SpD, SsB, [1] SW	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
St	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: excess salt.
[1] SX:				
Swastika part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: excess salt.
La Brier part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: excess salt, too clayey.
Texline:				
TED	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Thunderbird:				
[1] TH:				
Thunderbird part	Poor: shrink-swell, thin layer.	Unsuited	Unsuited	Poor: too clayey, small stones, large stones.
Torreon part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Tinaja:				
TNE	Good	Fair: excess fines.	Fair: excess fines.	Poor: small stones.
Torreon:				
[1] TO:				
Torreon part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Deacon part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Good.
Travessilla:				
[1] Tr:				
Travessilla part	Poor: thin layer	Unsuited: thin layer.	Unsuited	Poor: area reclaim, slope, thin layer.
Rock outcrop part				
[1] TS:				
Travessilla part	Poor: thin layer	Unsuited: thin layer.	Unsuited	Poor: area reclaim, slope, thin layer.
Bernal part	Poor: thin layer, area reclaim, low strength.	Unsuited	Unsuited	Poor: area reclaim, thin layer.
Rock outcrop part				
Tricon:				
[1] TX:				
Tricon part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.

TABLE 6.—*Construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Plack part	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Ustochrepts:				
[1] US:				
Ustochrepts part	Poor: slope			Poor: slope.
Rock outcrop part				
Vermejo:				
Ve, Vm	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, excess salt.
[1] Vs2:				
Vermejo part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, excess salt.
Swastika part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Wellsville:				
WEG	Poor: slope	Unsuited	Unsuited	Poor: small stones, slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

erals, reaction, and stratification are given in the soil series descriptions and in table 6.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones, are low in content of gravel and other coarse fragments, and have gentle slopes. They are low in soluble salts, which can limit plant growth. They are naturally fertile or respond well to fertilization. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salts.

Soils rated *poor* are very sandy soils, very firm clayey soils, soils with suitable layers less than 8 inches thick, soils having large amounts of gravel, stones, or soluble salts, steep soils, and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter a surface horizon is much preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter. Consequently, careful preservation and use of material from these horizons is desirable.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 7 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by the permeability and depth over fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and is of favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

An *aquifer-fed excavated pond* is a body of water created by excavating a pit or dugout into a groundwater aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 7 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability, texture, structure, depth to claypan or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

TABLE 7.—*Water management*

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Abreu:						
[1] AB:						
Abreu part	Slope, depth to rock.	Erodes easily, depth to rock.	No water			Slope, depth to rock.
Cypher part	Depth to rock, slope, seepage.	Piping, thin layer.	No water			Slope, depth to rock.
Angostura:						
[1] AG	Slope	Large stones, piping.	No water			Slope, large stones.
[1] AN:						
Angostura part	Slope	Large stones, piping.	No water			Slope, large stones.
Tolby part	Slope, seepage.	Large stones, seepage.	No water			Slope, large stones.
Apache:						
[1] ApD:						
Apache part	Depth to rock	Thin layer, low strength, piping.	No water			Depth to rock.
Ayon part	Slope, seepage.	Large stones, low strength, piping.	No water			Large stones, piping.
Aridic Argiustolls:						
[1] ARF, [1] ARG:						
Aridic Argiustolls part	Slope					Slope.
Rock outcrop part						
Bandera:						
[1] BA:						
Bandera part	Seepage, slope.	Seepage	No water			Droughty, slope.
Cinder land part						
Barela:						
[1] BE:						
Barela part	Depth to rock	Low strength, shrink-swell, large stones.	No water	Percs slowly, slope.	Percs slowly, slope.	Depth to rock, large stones, percs slowly.
Yankee part	Slope	Shrink-swell, compressible, low strength.	No water	Percs slowly, slope.	Slow intake, percs slowly, slope.	Percs slowly.
Berthoud:						
BhD	Seepage, slope.	Low strength, shrink-swell.	No water	Slope	Slope	Slope.
Brycan:						
[1] BR:						
Brycan part	Favorable	Piping, low strength.	No water	Percs slowly	Slope, erodes easily, percs slowly.	Piping.
[1] BR:						
Brycan part	Slope	Piping, low strength.	No water	Percs slowly	Slope, erodes easily, percs slowly.	Piping.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Bundo:						
[1] BU	Slope, seepage.	Piping	No water			Slope, droughty.
Burnac:						
[1] BY:						
Burnac part	Depth to rock, slope.	Large stones, low strength, shrink-swell.	No water			Large stones, depth to rock, percs slowly.
Hillery part	Slope, depth to rock.	Low strength, shrink-swell, compressible.	No water			Percs slowly, large stones.
Capulin:						
[1] CaD:						
Capulin part	Seepage	Low strength, shrink-swell.	No water	Slope	Erodes easily, excess lime.	Piping, soil blowing, erodes easily.
Ayon part	Slope, seepage.	Large stones, low strength, piping.	No water			Large stones, piping.
[1] CB:						
Capulin part	Seepage	Low strength, shrink-swell.	No water	Slope	Erodes easily, excess lime.	Piping, soil blowing, erodes easily.
Torreon part	Slope	Shrink-swell, low strength, compressible.	No water	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Carnero:						
[1] CP:						
Carnero part	Depth to rock, slope.	Low strength, shrink-swell, thin layer.	No water	Depth to rock, percs slowly.	Rooting depth, percs slowly.	Depth to rock, rooting depth, percs slowly.
Partri part	Favorable	Shrink-swell, low strength.	Deep to water			Percs slowly.
Dioxice part	Slope	Shrink-swell, low strength, piping.	No water	Percs slowly	Erodes easily, excess lime.	Erodes easily.
Colmor:						
CrB, CrC, CsB, CsC	Slope	Low strength, shrink-swell.	No water	Percs slowly, slope.	Erodes easily, slope.	Piping, percs slowly.
[1] CT:						
Colmor part	Slope	Low strength, shrink-swell.	No water	Percs slowly, slope.	Erodes easily, slope.	Piping, percs slowly.
[1] CV:						
Colmor part	Slope	Low strength, shrink-swell.	No water	Percs slowly, slope.	Erodes easily, slope.	Piping, percs slowly.
Vermejo part	Favorable	Low strength, shrink-swell, compressible.	No water	Excess salt, percs slowly.	Erodes easily, excess salt, percs slowly.	Erodes easily, percs slowly, piping.
Litle part	Depth to rock	Low strength, shrink-swell, thin layer.	No water	Excess salt, percs slowly.	Erodes easily, excess salt, percs slowly.	Depth to rock, percs slowly, slope.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Cypher:						
[1] CY:						
Cypher part	Depth to rock, slope, seepage.	Piping, thin layer.	No water			Slope, depth to rock.
Bundo part	Slope, seepage.	Piping	No water			Slope, droughty.
Dalhart:						
DaB, DaC	Seepage	Piping, low strength, shrink-swell.	No water	Favorable	Erodes easily	Erodes easily, piping.
[1] DB:						
Dalhart part	Seepage	Piping, low strength, shrink-swell.	No water	Favorable	Erodes easily	Erodes easily, piping.
Seelez part	Seepage	Piping	No water	Favorable	Erodes easily, seepage, soil blowing.	Erodes easily, piping.
Dallam:						
DmB, DmC2	Seepage	Low strength, shrink-swell.	No water	Favorable	Too sandy, erodes easily.	Too sandy.
DnB, DnB2	Seepage	Low strength, shrink-swell.	No water	Favorable	Erodes easily	Favorable.
Dargol:						
[1] DO:						
Dargol part	Slope, depth to rock.	Shrink-swell, low strength, thin layer.	No water			Slope, percs slowly, depth to rock.
Stout part	Slope, depth to rock, seepage.	Thin layer, piping.	No water			Depth to rock, small stones.
Vamer part	Depth to rock, slope.	Thin layer, shrink-swell, low strength.	No water			Depth to rock.
Deacon:						
[1] DP:						
Deacon part	Seepage, slope.	Shrink-swell, low strength.	No water	Slope	Slope, erodes easily.	Slope, erodes easily.
Ayon part	Slope, seepage.	Large stones, low strength, piping.	No water			Large stones, piping.
[1] DR:						
Deacon part	Seepage, slope.	Shrink-swell, low strength.	No water	Slope	Slope, erodes easily.	Slope, erodes easily.
La Brier part	Favorable	Low strength, compressible, shrink-swell.	No water	Percs slowly	Slow intake, percs slowly.	Percs slowly.
Manzano part	Slope	Low strength, shrink-swell, piping.	No water	Complex slope, percs slowly.	Floods	Erodes easily, piping.
[1] DsE:						
Deacon part	Seepage, slope.	Shrink-swell, low strength.	No water	Slope	Slope, erodes easily.	Slope, erodes easily.
Oro Grande part	Slope, depth to rock.	Large stones, thin layer, piping.	No water			Complex slope, depth to rock, large stones.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Laporte part	Depth to rock, slope.	Thin layer, piping.	No water			Depth to rock, rooting depth, slope.
Des Moines:						
[1] DT	Slope	Slope, large stones.	No water			Slope, large stones.
Dioxice:						
DxC, DxC2	Slope	Shrink-swell, low strength, piping.	No water	Percs slowly	Erodes easily, excess lime, soil blowing.	Erodes easily.
Etoe:						
[1] EE:						
Etoe part	Slope	Piping	No water			Piping, slope.
Etown part	Slope	Large stones, shrink-swell, low strength.	No water	Slope	Slope	Large stones, slope.
Frolic:						
[1] FC:						
Frolic part	Seepage, slope.	Hard to pack, piping.	Favorable	Floods, wetness.	Wetness, floods.	Piping.
Cumulic Haplaquolls part			Favorable	Floods, wetness.	Wetness, floods.	Wetness.
Fuera:						
[1] FD:						
Fuera part	Slope	Low strength, compressible, shrink-swell.	No water			Percs slowly, slope.
Burnac part	Depth to rock, slope.	Large stones, low strength, shrink-swell.	No water			Large stones, depth to rock, percs slowly.
[1] FE:						
Fuera part	Slope	Low strength, compressible, shrink-swell.	No water			Percs slowly, slope.
Dargol part	Slope, depth to rock.	Thin layer, shrink-swell, low strength.	No water			Slope, percs slowly, depth to rock.
Vamer part	Depth to rock, slope.	Thin layer, shrink-swell, low strength.	No water			Depth to rock.
Gruver:						
GaB, GbB, GcB2	Favorable	Piping, shrink-swell, low strength.	No water	Percs slowly	Favorable	Favorable.
Hillery:						
HrD	Slope, depth to rock.	Low strength, shrink-swell, compressible.	No water			Percs slowly, piping, large stones.
La Brier:						
Lb	Favorable	Low strength, compressible, shrink-swell.	No water	Percs slowly	Slow intake, percs slowly.	Percs slowly.
Lc	Favorable	Low strength, compressible, shrink-swell.	Slow refill	Excess salt, percs slowly.	Excess salt, percs slowly, slow intake.	Percs slowly.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
[1] Lr: La Brier part	Favorable	Low strength, compressible, shrink-swell.	No water	Percs slowly	Slow intake, percs slowly.	Percs slowly.
Rock outcrop part						
Laporte: LSF	Depth to rock, slope.	Thin layer, piping.	No water			
Litle: LtB	Depth to rock	Thin layer, shrink-swell, low strength.	No water	Excess salt, percs slowly.	Erodes easily, excess salt, percs slowly.	Depth to rock, percs slowly, slope.
Manzano: Ma	Favorable	Low strength, shrink-swell, piping.	No water	Complex slope, percs slowly.	Floods	Erodes easily, piping.
[1] MB: Manzano part	Favorable	Low strength, shrink-swell, piping.	No water	Complex slope, percs slowly.	Floods	Erodes easily, piping.
Manzano part	Slope	Low strength, shrink-swell, piping.	No water	Complex slope, percs slowly.	Floods	Erodes easily, piping.
Midnight: [1] Mn: Midnight part	Slope, depth to rock.	Large stones, thin layer.	No water			Slope, depth to rock, large stones.
Rombo part	Slope, depth to rock.	Thin layer, low strength, shrink-swell.	No water			Slope, depth to rock.
Rock outcrop part						
Mion: MoB	Slope, depth to rock.	Thin layer, low strength, shrink-swell.	No water	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.	Complex slope, depth to rock, percs slowly.
[1] Mp: Mion part	Slope, depth to rock.	Thin layer, low strength, shrink-swell.	No water	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.	Complex slope, depth to rock, percs slowly.
Rock outcrop part						
[1] MR: Mion part	Slope, depth to rock.	Thin layer, low strength, shrink-swell.	No water	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.	Complex slope, depth to rock, percs slowly.
Litle part	Depth to rock	Shrink-swell, thin layer, low strength.	No water	Excess salt, percs slowly.	Rooting depth, excess salt, percs slowly.	Depth to rock, percs slowly. slope.
Moreno: [1] MS: Moreno part	Slope	Shrink-swell, low strength, hard to pack.	No water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Cypher part	Depth to rock, slope, seepage.	Piping, thin layer.	No water			Slope, depth to rock.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Morval:						
[1] MT:						
Morval part	Slope	Low strength, compressible, shrink-swell.	No water	Slope	Erodes easily, slope.	Favorable.
Moreno part	Slope	Shrink-swell, low strength, hard to pack.	No water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Mughouse:						
[1] Mu:						
Mughouse part	Depth to rock, slope.	Thin layer, large stones, low strength.	No water	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Large stones, percs slowly, slope.
Swastika part	Slope	Compressible, low strength, shrink-swell.	No water	Percs slowly	Percs slowly, slow intake, slope.	Percs slowly.
Oro Grande:						
[1] OG:						
Oro Grande part	Slope, depth to rock.	Large stones, thin layer, piping.	No water			Complex slope, depth to rock, large stones.
Meloche part	Slope	Large stones, low strength, shrink-swell.	No water			Slope, large stones, percs slowly.
[1] OT:						
Oro Grande part	Slope, depth to rock.	Large stones, thin layer, piping.	No water			Complex slope, depth to rock, large stones.
Tafoya part	Slope, depth to rock.	Low strength, large stones.	No water			Large stones, percs slowly, slope.
Penrose: PE	Depth to rock, slope.	Thin layer, piping.	No water			Depth to rock, slope.
Plack: PL	Cemented pan, seepage.	Thin layer, piping.	No water	Cemented pan	Droughty, rooting depth, slope.	Cemented pan.
Ponil:						
[1] PV:						
Ponil part	Slope	Compressible, shrink-swell, low strength.	No water			Slope, percs slowly, large stones.
Vamer part	Depth to rock, slope.	Thin layer, shrink-swell, low strength.	No water			Depth to rock, rooting depth.
Raton:						
[1] Ra:						
Raton part	Slope, depth to rock.	Compressible, large stones, thin layer.	No water			Depth to rock, slope, large stones.
Barela part	Depth to rock	Low strength, shrink-swell, large stones.	No water	Percs slowly, slope.	Percs slowly, slope.	Depth to rock, large stones, percs slowly.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
[1] RD:						
Raton part	Slope, depth to rock.	Low strength, large stones, thin layer.	No water			Depth to rock, slope, large stones.
Dalcan part	Slope, depth to rock.	Low strength, thin layer, hard to pack.	No water			Depth to rock, slope, large stones.
[1] RE:						
Raton part	Slope, depth to rock.	Low strength, large stones, thin layer.	No water			Depth to rock, slope, large stones.
Wellsville part	Slope	Low strength, shrink-swell, piping.	No water			Piping, slope, erodes easily.
Ring:						
[1] RG:						
Ring part	Slope	Compressible, low strength, shrink-swell.	No water			Percs slowly.
Brycan part	Favorable	Piping, low strength.	No water	Percs slowly	Slope, erodes easily, percs slowly.	Piping.
Riverwash:						
RV						
[1] Rz:						
Riverwash part						
Manzano part	Favorable	Low strength, shrink-swell, piping.	No water	Complex slope, percs slowly.	Floods	Erodes easily, piping.
Saladon:						
SaC	Favorable	Low strength, compressible, shrink-swell.	Favorable	Percs slowly, floods, poor outlets.	Percs slowly, floods, wetness.	Wetness, percs slowly.
Seelez:						
SeB, SfC, SnA	Seepage	Piping	No water	Favorable	Erodes easily, seepage, soil blowing.	Erodes easily, piping.
Swastika:						
SoA	Favorable	Compressible, low strength, shrink-swell.	No water	Percs slowly	Percs slowly, slow intake, slope.	Percs slowly.
SpD, SsB, [1] SW	Slope	Compressible, low strength, shrink-swell.	No water	Percs slowly	Percs slowly, slow intake, slope.	Percs slowly.
St	Favorable	Compressible, low strength, shrink-swell.	Slow refill	Excess salt, percs slowly.	Excess salt, percs slowly, slow intake.	Percs slowly.
[1] SX:						
Swastika part	Slope	Compressible, low strength, shrink-swell.	Slow refill	Excess salt, percs slowly.	Excess salt, percs slowly, slow intake.	Percs slowly.
La Brier part	Favorable	Low strength, compressible, shrink-swell.	Slow refill	Excess salt, percs slowly.	Excess salt, percs slowly, slow intake.	Percs slowly.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Texline: TED	Seepage	Low strength, shrink-swell.	No water	Favorable	Erodes easily, slope.	Favorable.
Thunderbird:						
[1] TH: Thunderbird part	Depth to rock, slope.	Thin layer, shrink-swell, low strength.	No water			Depth to rock, percs slowly.
Torreon part	Slope	Shrink-swell, low strength, compressible.	No water	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Tinaja: TNE	Slope, seepage.	Piping	No water	Slope	Slope, droughty, seepage.	Poor outlets, slope.
Torreon:						
[1] TO: Torreon part	Slope	Shrink-swell, low strength, compressible.	No water	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Deacon part	Seepage, slope.	Shrink-swell, low strength.	No water	Slope	Slope, erodes easily.	Slope, erodes easily.
Travessilla:						
[1] Tr: Travessilla part	Depth to rock, slope.	Thin layer, piping.	No water			Depth to rock, slope, erodes easily.
Rock outcrop part						
[1] TS: Travessilla part	Depth to rock, slope.	Thin layer, piping.	No water			Depth to rock, slope, erodes easily.
Bernal part	Depth to rock, slope.	Thin layer, low strength, shrink-swell.	No water			Depth to rock.
Rock outcrop part						
Tricon:						
[1] TX: Tricon part	Cemented pan	Thin layer, shrink-swell, low strength.	No water			Cemented pan, percs slowly, rooting depth.
Plack part	Cemented pan, seepage.	Thin layer, piping.	No water	Cemented pan	Droughty, rooting depth, slope.	Cemented pan, rooting depth.
Ustochrepts:						
[1] US: Ustochrepts part	Slope		No water			Complex slope.
Rock outcrop part						
Vermejo: Ve, Vm	Favorable	Low strength, shrink-swell, compressible.	No water	Excess salt, percs slowly.	Erodes easily, excess salt, percs slowly.	Erodes easily, percs slowly, piping.

TABLE 7.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
[1] Vs2:						
Vermejo part	Favorable	Low strength, shrink-swell, compressible.	No water	Excess salt, percs slowly.	Erodes easily, excess salt, percs slowly.	Erodes easily, percs slowly, piping.
Swastika part	Slope	Compressible, low strength, shrink-swell.	No water	Percs slowly	Percs slowly, slow intake, slope.	Percs slowly.
Wellsville:						
WEG	Slope	Low strength, shrink-swell, piping.	No water			Piping, slope, erodes easily.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff and allow the water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity of slope and steepness, depth to bedrock or other unfavorable material, permeability, ease of establishing vegetation, and resistance to water erosion, soil blowing, soil slipping, and piping.

Recreation [8]

The soils of Colfax County are rated in table 8 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreational use by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 8 the limitations of soils are rated as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 5, and interpretations for dwellings without basements and for local roads and streets, given in table 4.

Camp areas require such site preparation as shaping and leveling tent, small trailer, and parking areas; stabilizing roads and intensively used areas; and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet nor subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and not wet nor subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over rock should be sufficient to allow necessary grading.

The design and layout of paths and trails for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have

[8] DAVID E. CHALK, biologist, Soil Conservation Service, helped prepare this section.

TABLE 8.—*Recreational development*

[Some of the terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Abreu:				
[1] AB:				
Abreu part	Severe: slope	Severe: slope	Severe: slope, small stones.	Moderate: slope.
Cypher part	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Angostura:				
[1] AG:				
Angostura part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Angostura part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
[1] AN:				
Angostura part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Tolby part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Apache:				
[1] ApD:				
Apache part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock	Moderate: small stones.
Ayon part	Moderate: small stones.	Moderate: small stones.	Severe: small stones	Moderate: small stones.
Aridic Argiustolls:				
[1] ARF, [1] ARG:				
Aridic Argiustolls part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Rock outcrop part				
Bandera:				
[1] BA:				
Bandera part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Cinder land part				
Barela:				
[1] BE:				
Barela part	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Barela part	Moderate: percs slowly.	Slight	Severe: slope	Slight.
Yankee part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Berthoud:				
BhD	Slight	Slight	Moderate: slope	Slight.
Brycan:				
[1] BR:				
Brycan part	Slight	Slight	Slight	Slight.
Brycan part	Slight	Slight	Moderate: slope	Slight.
Bundo:				
[1] BU	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Burnac:				
[1] BY:				
Burnac part	Severe: percs slowly.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.
Hillery part	Severe: percs slowly.	Moderate: slope	Severe: slope, percs slowly.	Slight.
Capulin:				
[1] CaD:				
Capulin part	Slight	Slight	Moderate: slope	Slight.
Ayon part	Moderate: small stones.	Moderate: small stones.	Severe: small stones, slope.	Moderate: small stones.
[1] CB:				
Capulin part	Slight	Slight	Moderate: slope	Slight.
Torreon part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Carnero:				
[1] CP:				
Carnero part	Moderate: percs slowly.	Slight	Moderate: depth to rock, percs slowly, slope.	Slight.
Partri part	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey.	Moderate: too clayey.
Dioxice part	Slight	Slight	Moderate: slope	Slight.
Colmor:				
CrB, CrC, [1] CT	Moderate: percs slowly, dusty.	Moderate: dusty	Moderate: slope, percs slowly, dusty.	Moderate: dusty.
CsB, CsC	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: slope, too clayey, percs slowly.	Moderate: too clayey.
[1] CV:				
Colmor part	Moderate: percs slowly, dusty.	Moderate: dusty	Severe: slope	Moderate: dusty.
Vermejo part	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
Litle part	Severe: too clayey	Severe: too clayey	Severe: too clayey	Severe: too clayey.
Cypher:				
[1] CY:				
Cypher part	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Bundo part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Dalhart:				
DaB, DaC	Slight	Slight	Moderate: slope	Slight.
[1] DB:				
Dalhart part	Slight	Slight	Slight	Slight.
Seelez part	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
Dallam:				
DmB	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.
DmC2	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DnB, DnB2	Slight	Slight	Slight	Slight.
Dargol:				
[1] DO:				
Dargol part	Severe: percs slowly	Slight	Severe: slope, large stones, percs slowly.	Slight.
Stout part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
Vamer part	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
Deacon:				
[1] DP:				
Deacon part	Slight	Slight	Moderate: slope	Slight.
[1] DP:				
Ayon part	Moderate: small stones.	Moderate: small stones.	Severe: small stones	Moderate: small stones.
[1] DR:				
Deacon part	Slight	Slight	Severe: slope	Slight.
La Brier part	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
Manzano part	Severe: floods	Moderate: floods	Moderate: slope, floods.	Slight.
[1] DsE:				
Deacon part	Slight	Slight	Severe: slope	Slight.
Oro Grande part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, slope.	Moderate: small stones.
Laporte part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: depth to rock, slope, small stones.	Moderate: small stones.
Des Moines:				
[1] DT	Severe: slope	Severe: slope	Severe: slope, small stones, large stones.	Severe: slope.
Dioxice:				
DxC, DxC2	Slight	Slight	Moderate: slope	Slight.
Etoe:				
[1] EE:				
Etoe part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Etown part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Frolic:				
[1] FC:				
Frolic part	Severe: floods	Severe: floods	Severe: floods	Moderate: floods.
Cumulic Haplaquolls part	Severe: floods wetness.	Severe: floods wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Fuera:				
[1] FD:				
Fuera part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Burnac part	Severe: percs slowly, slope.	Severe: slope	Severe: large stones, slope.	Moderate: slope.
[1] FE:				
Fuera part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Dargol part	Severe: slope, percs slowly.	Severe: slope	Severe: slope, large stones, percs slowly.	Moderate: slope.
Vamer part	Moderate: large stones, percs slowly, slope.	Moderate: slope	Severe: depth to rock, slope, large stones.	Moderate: large stones.
Gruver:				
GaB, GbB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
GcB2	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
Hillery:				
HrD	Severe: percs slowly	Slight	Severe: percs slowly, large stones.	Slight.
La Brier:				
Lb	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
Lc	Severe: floods, percs slowly.	Moderate: floods, too clayey.	Severe: percs slowly	Moderate: too clayey.
[1] Lr:				
La Brier part	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
Rock outcrop part				
Laporte:				
LSF	Severe: slope	Severe: slope	Severe: depth to rock, slope.	Moderate: slope, small stones.
Litle:				
LtB	Moderate: too clayey, dusty.	Moderate: too clayey, dusty.	Moderate: dusty, slope.	Moderate: too clayey, dusty.
Manzano:				
Ma	Severe: floods	Moderate: floods	Moderate: floods	Slight.
[1] MB:				
Manzano part	Severe: floods	Moderate: floods	Moderate: floods	Slight.
Manzano part	Severe: floods	Moderate: floods	Moderate: slope, floods.	Slight.
Midnight:				
[1] Mn:				
Midnight part	Severe: slope	Severe: slope	Severe: slope, depth to rock, large stones.	Severe: slope.
[1] Mn:				
Rombo part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Rock outcrop part				
Mion:				
MoB	Moderate: percs slowly.	Slight	Severe: depth to rock.	Slight.
[1] Mp:				
Mion part	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Moderate: slope.
Rock outcrop part				
[1] MR:				
Mion part	Moderate: percs slowly.	Slight	Severe: slope, depth to rock.	Slight.
Litle part	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope.	Moderate: dusty.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Moreno:				
[1] MS:				
Moreno part	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Slight.
Cypher part	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Moderate: slope.
Morval:				
[1] MT:				
Morval part	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
Moreno part	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Moderate: slope.
Mughouse:				
[1] Mu:				
Mughouse part	Moderate: large stones, percs slowly, slope.	Moderate: large stones.	Severe: large stones, slope.	Moderate: large stones.
Swastika part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Oro Grande:				
[1] OG:				
Oro Grande part	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones, small stones.
Meloche part	Severe: slope, large stones, percs slowly.	Severe: slope, large stones.	Severe: slope, large stones, percs slowly.	Severe: slope, large stones.
[1] OT:				
Oro Grande part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: depth to rock, slope, small stones.	Severe: slope, small stones.
Tafoya part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Penrose:				
PE	Slight	Slight	Severe: depth to rock	Slight.
Plack:				
PL	Slight	Slight	Severe: cemented pan.	Slight.
Ponil:				
[1] PV:				
Ponil part	Severe: slope, percs slowly.	Severe: slope	Severe: slope, large stones, percs slowly.	Moderate: large stones, slope.
Vamer part	Moderate: large stones, percs slowly, slope.	Moderate: slope	Severe: depth to rock, slope, large stones.	Moderate: large stones.
Raton:				
[1] Ra:				
Raton part	Severe: large stones	Severe: large stones	Severe: slope, large stones, depth to rock.	Severe: large stones.
Barela part	Moderate: percs slowly, large stones.	Slight	Severe: slope, large stones.	Slight.
[1] RD:				
Raton part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: large stones.
Dalcan part	Moderate: small stones, percs slowly, large stones.	Moderate: small stones, large stones.	Severe: large stones, depth to rock, slope.	Moderate: small stones, large stones.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
[1] RE:				
Raton part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: large stones.
Wellsville part	Severe: slope	Severe: slope	Severe: small stones, slope.	Severe: slope.
Ring:				
[1] RG:				
Ring part	Moderate: percs slowly, large stones, small stones.	Moderate: large stones, small stones.	Moderate: slope, small stones, large stones.	Moderate: large stones, small stones.
Brycan part	Slight	Slight	Slight	Slight.
Riverwash:				
RV				
[1] Rz:				
Riverwash part				
Manzano part	Severe: floods	Moderate: floods	Moderate: floods	Slight.
Saladon:				
SaC	Severe: floods, wetness, too clayey.	Severe: floods, wetness too clayey.	Severe: floods wetness, too clayey.	Severe: floods, wetness, too clayey.
Seelez:				
SeB, SnA	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.
SfC	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
Swastika:				
SoA	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
SpD	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
SsB	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: slope, percs slowly, too clayey.	Moderate: too clayey.
St	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey.	Moderate: too clayey.
[1] SW	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
[1] SX:				
Swastika part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
La Brier part	Severe: floods, percs slowly.	Moderate: floods, too clayey.	Severe: percs slowly	Moderate: too clayey.
Texline:				
TED	Slight	Slight	Moderate: slope	Slight.
Thunderbird:				
[1] TH:				
Thunderbird part	Moderate: percs slowly, large stones, small stones.	Moderate: small stones, large stones.	Severe: large stones, small stones.	Moderate: large stones, small stones.
Torreon part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Tinaja:				
TNE	Moderate: slope	Moderate: slope	Severe: slope	Slight.

TABLE 8.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Torreon:				
[1]TO:				
Torreon part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Deacon part	Slight	Slight	Moderate: slope	Slight.
Travessilla:				
[1]Tr:				
Travessilla part	Severe: slope	Severe: slope	Severe: depth to rock, slope.	Moderate: slope.
Rock outcrop part				
[1]TS:				
Travessilla part	Severe: slope	Severe: slope	Severe: depth to rock, slope.	Moderate: slope.
Bernal part	Slight	Slight	Severe: depth to rock	Slight.
Rock outcrop part				
Tricon:				
[1]TX:				
Tricon part	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Plack part	Slight	Slight	Severe: cemented pan.	Slight.
Ustochrepts:				
[1]US:				
Ustochrepts part	Severe: slope	Severe: slope	Severe: slope, small stones, depth to rock.	Severe: slope.
Rock outcrop part				
Vermejo:				
Ve, Vm	Severe: floods	Moderate: floods, too clayey.	Severe: floods	Moderate: too clayey.
[1]Vs2:				
Vermejo part	Severe: floods	Moderate: floods, too clayey.	Severe: floods	Moderate: too clayey.
Swastika part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Wellsville:				
WEG	Severe: slope	Severe: slope	Severe: small stones, slope.	Severe: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

moderate slopes and have few or no stones or boulders on the surface.

Wildlife Habitat[9]

Wildlife is an important natural resource of Colfax County. The soils of this county have influenced, in part, the past and present land uses which determine the vegetational types now present. Wildlife, as a crop of the land, is basically dependent upon the soils and strongly influenced by man's use of the soil. Land uses in this area are changing as a result of current population growth.

The history of land uses and current recreational developments in the mountain areas combine to influence the type, quantity, and quality of existing wildlife habitats.

Woodland habitats are found in the higher elevations of Colfax County. These include shrubs, pinyon-juniper, ponderosa pine, and mixed conifer stands.

Wetland habitats are associated with two major drainages, the Canadian River and the Cimarron Creek. These two drainages have several manmade irrigation projects. These irrigation lakes provide habitat for a

[9] DAVID E. CHALK, biologist, Soil Conservation Service, helped prepare this section.

variety of wintering waterfowl and shorebirds. Of particular interest is the Maxwell National Waterfowl Refuge managed by the U.S. Fish and Wildlife Service.

Rangeland habitats characteristically reflect the moisture regime and the long history of livestock grazing. The plant communities associated with the soils of the foothills are complex and have browse value of local importance to pronghorn antelopes and mule deer (fig. 9).

Both irrigated and dry cropland occur in Colfax County. Hay and grain crops are important to doves and scaled quail but are of some local significance to pheasants.

Important game species which occur in some abundance within Colfax County include elk, black bear, mule deer, turkey, mourning dove, scaled quail, blue grouse, band-tailed pigeon, and pronghorn antelope. Rocky Mountain bighorn sheep have been introduced into the Cimarron Canyon area. Barbary sheep have been introduced in the Canadian River canyon. Other wildlife species include cottontail rabbit, prairie dog, weasel, marsh and red-tailed hawks, turkey, vulture, raven, roadrunner, coyote, bobcat, and badger. There is also a large representation of resident and migratory songbirds. Colfax County also provides habitats for salamanders, snakes, and toads. A number of bald and golden eagles winter in the area.

The New Mexico Department of Game and Fish stocks trout in several manmade lakes. There is also a variety of warm water fish to be found in some of the lakes of the lower elevations. Northern pike can be caught in Springer and Miami Lakes.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife will either be scarce or will not inhabit the area.

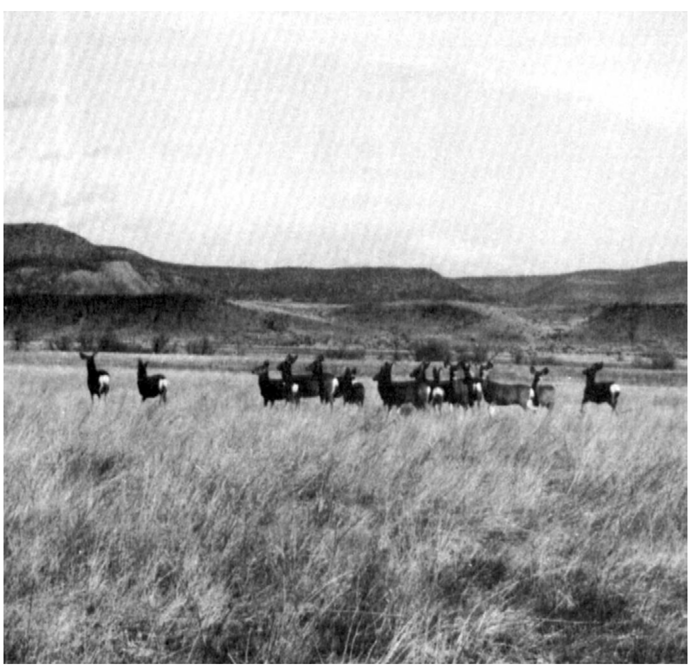


Figure 9.—**Mule deer on Clayey range site. The soil is Vermejo silty clay loam.**

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering the natural establishment of desirable plants.

In table 9 the soils in the Colfax County survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, sorghum, wheat, oats, barley, millet, and sunflowers. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, bluegrass, lovegrass, switchgrass, bromegrass, timothy, orchardgrass, clover, alfalfa, and tall wheatgrass. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally estab-

TABLE 9.—*Wildlife habitat potentials*

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herba-ceous plants	Conif-erous plants	Shrubs	Wet-land plants	Shallow water areas	Open-land wildlife	Wood-land wildlife	Wet-land wildlife	Range-land wildlife
Abreu:											
[1] AB:											
Abreu part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Cypher part	Very poor.	Very poor.	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	
Angostura:											
[1] AG:											
Angostura part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Angostura part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
[1] AN:											
Angostura part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Tolby part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Apache:											
[1] ApD:											
Apache part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Avon part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Aridic Argiustolls:											
[1] ARF, [1] ARG:											
Aridic Argiustolls part	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Rock outcrop part											
Bandera:											
[1] BA:											
Bandera part	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Cinder land part											
Barela:											
[1] BE:											
Barela part	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Barela part	Poor	Fair	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Yankee part	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Berthoud:											
BhD	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Poor.
Brycan:											
[1] BR:											
Brycan part	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Brycan part	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Bundo:											
[1] BU	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Burnac:											
[1] BY:											
Burnac part	Very poor.	Very poor.	Good	Good	Good	Poor	Poor	Poor	Fair	Poor	
Hillery part	Poor	Fair	Good		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Capulin:											
[1] CaD:											
Capulin part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Ayon part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
[1] CB:											
Capulin part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Torreon part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Carnero:											
[1] CP:											
Carnero part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Poor.
Partri part	Poor	Fair	Poor		Poor	Poor	Very poor.	Poor		Very poor.	Poor.
Dioxice part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Colmor:											
CrB, CsB	Good	Good	Fair		Fair	Poor	Very poor.	Good		Very poor.	Fair.
CrC, CsC	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
[1] CT	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
[1] CV:											
Colmor part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Vermejo part	Poor	Poor	Fair		Poor	Poor	Poor	Poor		Poor	Poor.
Litle part	Poor	Poor	Fair		Poor	Poor	Very poor.	Poor		Very poor.	Fair.
Cypher:											
[1] CY:											
Cypher part	Very poor.	Very poor.	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	
Bundo part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	
Dalhart:											
DaB, DaC	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
[1] DB:											
Dalhart part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Seelez part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Dallam:											
DmB, DmC2, DnB2	Poor	Fair	Fair		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
DnB	Fair	Fair	Fair		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
Dargol:											
[1] DO:											
Dargol part	Poor	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	
Stout part	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	
Vamer part	Poor	Poor	Fair	Fair	Fair	Very poor.	Poor	Poor	Fair	Very poor.	Fair.
Deacon:											
[1] DP:											
Deacon part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Ayon part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
[1] DR:											
Deacon part	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
La Brier part	Fair	Good	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Poor.
Manzano part	Good	Good	Good		Poor	Poor	Poor	Good		Poor	Poor.
[1] DsE:											
Deacon part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Oro Grande part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Laporte part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Des Moines:											
[1] DT	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Dioxice:											
DxC, DxC2	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Etoe:											
[1] EE:											
Etoe part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Etown part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Frolic:											
[1] FC:											
Frolic part	Poor	Fair	Good		Good	Good	Fair	Good		Fair	Good.
Cumulic Haplaquolls part	Very poor.	Poor	Poor		Poor	Good	Good	Poor		Good	Poor.
Fuera:											
[1] FD:											
Fuera part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Burnac part	Very poor.	Very poor.	Good	Good	Good	Poor	Poor	Poor	Fair	Poor	
[1] FE:											
Fuera part	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	
Dargol part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	
Vamer part	Poor	Poor	Fair	Fair	Fair	Very poor.	Poor	Poor	Fair	Very poor.	Fair.
Gruver:											
GaB, GbB	Fair	Fair	Fair		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
GcB2	Poor	Poor	Fair		Poor	Very poor.	Very poor.	Poor		Very poor.	Poor.
Hillery:											
HrD	Very poor.	Very poor.	Good		Fair	Poor	Very poor.	Poor		Very poor.	Fair.
La Brier:											
Lb	Good	Good	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Poor.
Lc	Poor	Poor	Fair		Poor	Poor	Poor	Poor		Poor	Poor.
[1] Lr:											
La Brier part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Poor.
Rock outcrop part											
Laporte:											
LSF	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Litle:											
LtB	Poor	Poor	Fair		Poor	Fair	Poor	Poor		Fair	
Manzano:											
Ma	Good	Good	Fair		Poor	Poor	Poor	Fair		Poor	Poor.
[1] MB:											
Manzano part	Fair	Good	Fair		Poor	Poor	Poor	Fair		Poor	Poor.
Manzano part	Poor	Fair	Fair		Poor	Poor	Poor	Fair		Poor	Poor.

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herba-ceous plants	Conif-erous plants	Shrubs	Wet-land plants	Shallow water areas	Open-land wildlife	Wood-land wildlife	Wet-land wildlife	Range-land wildlife
Midnight:											
[1] Mn:											
Midnight part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rombo part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rock outcrop part											
Mion:											
MoB	Poor	Poor	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
[1] Mp:											
Mion part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Rock outcrop part											
[1] MR:											
Mion part	Poor	Poor	Fair		Fair	Poor	Poor	Poor		Poor	Fair.
Litle part	Poor	Poor	Fair		Poor	Poor	Very poor.	Poor		Very poor.	Fair.
Moreno:											
[1] MS:											
Moreno part	Poor	Fair	Good		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
Cypher part	Very poor.	Very poor.	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	
Morval:											
[1] MT:											
Morval part	Poor	Fair	Good		Fair	Poor	Poor	Fair		Poor	Fair.
Moreno part	Poor	Fair	Good		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
Mughouse:											
[1] Mu:											
Mughouse part	Poor	Poor	Fair		Fair	Poor	Very poor.	Poor		Very poor.	Fair.
Swastika part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Oro Grande:											
[1] OG:											
Oro Grande part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Meloche part	Very poor.	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
[1] OT:											
Oro Grande part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Tafoya part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Penrose:											
PE	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Plack:											
PL	Very poor.	Very poor.	Poor		Very poor.	Very poor.	Very poor.	Very poor.		Very poor.	Very poor.
Ponil:											
[1] PV:											
Ponil part	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Vamer part	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Poor	Poor	Fair	Very poor.	Fair.
Raton:											
[1] Ra:											
Raton part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Barela part	Poor	Poor	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
[1] RD:											
Raton part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Dalcan part	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
[1] RE:											
Raton part	Very poor.	Very poor.	Fair		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Wellsville part	Very poor.	Very poor.	Good		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.
Ring:											
[1] RG:											
Ring part	Poor	Poor	Good	Good	Good	Poor	Poor	Fair	Good	Poor	
Brycan part	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Riverwash:											
RV											
[1] Rz:											
Riverwash part											
Manzano part	Fair	Good	Good		Fair	Fair	Fair	Good		Fair	Fair.
Saladon:											
SaC	Poor	Poor	Good		Poor	Good	Good	Poor		Good	Fair.
Seelez:											
SeB, SfC	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
SnA	Good	Good	Fair		Fair	Poor	Very poor.	Good		Very poor.	Fair.
Swastika:											
SoA	Good	Good	Fair		Fair	Good	Good	Good		Good	
SpD	Fair	Good	Fair		Fair	Poor	Very poor.	Fair		Very poor.	
SsB	Fair	Good	Fair		Fair	Poor	Poor	Fair		Poor	
St	Poor	Poor	Fair		Poor	Good	Good	Poor		Good	

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
[1]SW	Poor	Poor	Fair		Fair	Poor	Poor	Poor		Very poor.	Fair.
[1]SX:											
Swastika part	Poor	Poor	Fair		Poor	Fair	Fair	Poor		Fair	Poor.
La Brier part	Poor	Poor	Fair		Poor	Poor	Poor	Poor		Poor	Poor.
Texline: TED	Poor	Fair	Fair		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
Thunderbird: [1]TH:											
Thunderbird part	Poor	Fair	Fair		Fair	Very poor.	Very poor.	Fair		Very poor.	Fair.
Torreon part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Tinaja: TNE	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Torreon: [1]TO:											
Torreon part	Poor	Fair	Fair		Poor	Poor	Very poor.	Fair		Very poor.	Fair.
Deacon part	Poor	Fair	Fair		Fair	Poor	Very poor.	Fair		Very poor.	Fair.
Travessilla: [1]Tr:											
Travessilla part	Very poor.	Very poor.	Poor		Fair	Very poor.	Very poor.	Very poor.		Very poor.	Fair.
Rock outcrop part											
[1]TS:											
Travessilla part	Very poor.	Very poor.	Poor		Fair	Very poor.	Very poor.	Very poor.		Very poor.	Fair.
Bernal part	Poor	Poor	Fair		Poor	Very poor.	Very poor.	Poor		Very poor.	Fair.
Rock outcrop part											
Tricon: [1]TX:											
Tricon part	Poor	Poor	Fair		Poor	Poor	Very poor.	Poor		Very poor.	Fair.
Plack part	Very poor.	Very poor.	Poor		Very poor.	Very poor.	Very poor.	Very poor.		Very poor.	Very poor.
Ustochrepts: [1]US:											
Ustochrepts part	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Rock outcrop part											
Vermejo: Ve, Vm	Poor	Poor	Fair		Poor	Good	Good	Poor		Good	Poor.

TABLE 9.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—			
	Grain and seed crops	Grasses and legumes	Wild-herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
[1] Vs2:											
Vermejo part	Poor	Poor	Fair		Poor	Poor	Poor	Poor		Poor	Poor.
Swastika part	Poor	Poor	Fair		Poor	Poor	Poor	Poor		Very poor.	Poor.
Wellsville:											
WEG	Very poor.	Very poor.	Good		Fair	Very poor.	Very poor.	Poor		Very poor.	Fair.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

lished herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, goldenrod, Russian thistle, lambs-quarter, western wheatgrass, and grama. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are ponderosa pine, Engelmann spruce, Douglas-fir, pinyon pine, and one-seed juniper. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruits, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are mountainmahogany, four-wing saltbush, snowberry, and skunkbush sumac. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, saltgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include mourning dove, scaled quail, pheasant, western meadowlark, field sparrow, killdeer, cottontail rabbit, and skunk.

Woodland habitat consists of conifers with associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, blue grouse, broad-tailed hummingbird, woodpecker, ground squirrels, mule deer, elk, and black bear.

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, shore birds, red-winged blackbird, muskrat, mink, and beaver.

Rangeland habitat consists of wild herbaceous plants and shrubs on range. Examples of wildlife attracted to this habitat are pronghorn antelope, jackrabbit, mule deer, prairie dog, coyote, marsh hawk, scaled quail, burrowing owl, meadowlark, and lark bunting.

Soil Properties

Extensive data about soil properties collected during the soil survey are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of samples selected from representative soil profiles in the field.

When he makes soil borings during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other rock fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in-place

under the existing soil moisture conditions. He records the root depth of existing plants, determines soil pH or reaction, and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to characterize key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the county, but laboratory data for many of the soil series are available from nearby areas.

Based on summaries of available field and laboratory data, and listed in tables in this section, are estimated ranges in engineering properties and classifications and in physical and chemical properties for each major horizon of each soil in the county. Also, pertinent soil and water features, engineering test data, and data obtained from laboratory analyses, both physical and chemical, are presented.

Engineering properties

Table 10 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties of each horizon is given for each soil series in "Descriptions of the Soils."

Texture is described in table 10 in standard terms used by the United States Department of Agriculture. These terms are defined according to percentages by weight of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering (*10*) use are the Unified Soil Classification System (USCS) (*2*) and the American Association of State Highway and Transportation Officials Soil Classification System (AASHTO) (*1*). In table 10 soils in the county are classified according to both systems.

The USCS system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution by percent weight of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example CL–ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified as one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A–1 are coarse grained and low in content of fines. At the other extreme, in group A–7, are fine-grained soils. Highly organic soils are classified as A–8 on the basis of visual inspection.

When laboratory data are available, the A–1, A–2, and A–7 groups are further classified as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or more for the poorest. The AASHTO classification for soils tested in the county, with group index numbers in parentheses, is given in table 13. The estimated classification, without group index numbers, is given in table 10. Also in table 10 the percentage, by weight, of cobbles or the rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined largely by observing volume percentage in the field and then converting it, by formula, to weight percentage.

Percentage by weight of the soil material less than 3 inches in diameter that passes each of four standard sieves is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the county and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil. These indexes are used in both the USCS and the AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior.

Range in liquid limit and plasticity index are estimated on the basis of test data from the county or from nearby areas and on observations of the many soil borings made during the survey.

Physical and chemical properties

Table 11 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to

TABLE 10.—*Engineering properties and classifications*

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Abreu:											
[1] AB:											
Abreu part	0–15	Gravelly loam	ML, SM, GM	A–4, A–2	0	60–80	55–75	45–70	25–55	20–30	NP–5
	15–43	Gravelly clay loam, very gravelly clay loam, gravelly sandy clay loam.	GM, GC	A–2	0	25–50	20–45	15–45	10–35	35–45	10–20
	43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cypher part	0–4	Gravelly loam	GM, SM	A–1, A–2, A–4	0–5	55–80	50–75	35–70	15–50	20–30	NP–5
	4–18	Gravelly sandy loam, gravelly loam, very gravelly sandy loam.	GM, GW–GM	A–1, A–2	0–5	30–50	25–45	15–40	10–30	20–30	NP–5
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Angostura:											
[1] AG:											
Angostura part	0–26	Stony fine sandy loam.	SM	A–2, A–4	15–40	80–100	75–95	50–85	25–50	20–30	NP–5
	26–60	Stony sandy clay loam, cobbly sandy clay loam, gravelly sandy clay loam.	SC	A–2, A–6	15–40	65–100	50–90	35–85	20–50	25–30	10–15
Angostura part	0–7	Stony loam	ML, SM	A–4	15–40	80–100	75–95	70–85	45–65	20–30	NP–5
	7–22	Stony sandy clay loam, cobbly sandy clay loam, gravelly sandy clay loam.	SC	A–2, A–6	15–40	65–100	50–90	35–85	20–50	25–30	10–15
	22–60	Stony sandy clay loam, very stony sandy clay loam, gravelly sandy clay loam.	GC, SC	A–2, A–6	40–80	45–95	35–90	25–80	15–50	25–30	10–15
[1] AN:											
Angostura part	0–12	Stony sandy loam.	SM	A–2, A–4	15–40	80–100	75–95	50–65	25–40	---	NP
	12–17	Stony sandy clay loam, cobbly sandy clay loam, gravelly sandy clay loam.	SC	A–2, A–6	15–40	65–100	50–95	35–85	20–50	25–30	10–15

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
	17–65	Stony sandy clay loam, very stony sandy clay loam, gravelly sandy clay loam.	GC, SC	A-2, A-6	40–80	45–95	35–90	25–80	15–50	25–30	10–15
[1] AN: Tolby part	0–22	Stony loam	GM	A-2, A-4	20–60	40–70	35–65	30–60	25–50	20–30	NP–5
	22–44	Cobbly loamy sand.	SM, GM	A-1	25–40	50–70	45–65	25–50	10–20	---	NP
	44–57	Cobbly sandy loam.	SM, GM	A-1, A-2	25–55	55–75	50–70	30–50	15–30	---	NP
	57–80	Cobbly loamy sand.	SM, GM	A-1	25–55	50–75	45–70	25–50	10–25	---	NP
Apache: [1] ApD: Apache part	0–17	Cobbly loam	CL	A-6	15–40	80–100	75–95	65–90	50–75	30–40	10–20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ayon part	0–6	Cobbly silt loam.	ML, CL-ML	A-4	15–50	75–90	65–90	55–85	50–70	25–35	5–10
	6–60	Very stony loam, very cobbly loam.	ML, GM	A-4, A-2	40–80	50–90	45–90	40–80	30–60	20–35	NP–10
Aridic Argiustolls: [1] ARF, [1] ARG: Aridic Argiustolls part	0–60	Variable	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Bandera: [1] BA: Bandera part	0–19	Gravelly loam	GM, ML	A-4	0	65–80	65–75	55–70	40–60	20–30	NP–5
	19–60	Cinders	GP	A-1	0	15–35	10–30	0–5	0	---	NP
Cinder land part.											
Barela: [1] BE: Barela part	0–4	Silt loam	ML, CL-ML	A-4	0–10	95–100	90–100	80–100	65–90	20–35	5–10
	4–12	Silty clay, silty clay loam.	ML, CL	A-6	0–15	95–100	90–100	80–100	70–95	35–40	10–20
	12–31	Stony clay	CH, CL	A-7	10–30	95–100	90–100	80–100	70–90	45–60	20–35
	31–41	Very stony clay.	CH, CL	A-7	25–65	85–95	75–85	70–85	55–80	45–60	20–35
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Barela part	0–4	Stony silt loam.	ML, CL-ML	A-4	5–15	95–100	90–100	80–100	65–90	20–35	5–10
	4–10	Silty clay, silty clay loam.	ML, CL	A-6	0–15	95–100	90–100	80–100	70–95	35–40	10–20
	10–28	Stony clay	CH, CL	A-7	10–30	95–100	90–100	80–100	70–90	45–60	20–35
	28–42	Very stony clay.	CH, CL	A-7	25–65	85–95	75–85	70–85	55–80	45–60	20–35
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Yankee part	0-9	Silt loam	ML	A-4	0	100	100	90-100	70-90	25-35	NP-10
	9-60	Clay, silty clay	ML, MH	A-7	0	100	100	90-100	75-95	45-55	10-25
Berthoud: BhD	0-11	Loam	CL-ML, ML	A-4	0	95-100	90-100	90-100	55-75	25-35	5-10
	11-64	Loam, clay loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	65-95	50-85	25-40	5-15
Brycan: [1] BR: Brycan part	0-8	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	8-60	Sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-10	95-100	90-100	75-90	35-55	25-35	5-15
[1] BR: Brycan part	0-14	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	14-54	Sandy clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-10	95-100	90-100	75-90	35-55	25-35	5-15
	54-60	Clay loam	CL	A-6	0-15	90-100	85-100	70-90	60-80	30-40	10-20
Bundo: [1] BU	0-30	Gravelly sandy loam.	SM, GM	A-1, A-2	10-20	40-75	35-70	20-50	10-30	-------	NP
	30-56	Gravelly loam, very gravelly loam.	GM, SM	A-1, A-2	5-15	45-75	30-50	25-40	20-35	20-30	NP-5
	56-80	Very gravelly sandy clay loam.	GC, SC, GM-GC, SM-SC	A-2	5-15	45-75	25-50	20-40	10-25	25-35	5-15
Burnac: [1] BY: Burnac part	0-12	Stony loam	ML, CL-ML	A-4	25-35	95-100	90-95	75-90	55-75	25-35	5-10
	12-31	Clay, silty clay	CH	A-7	0	90-100	85-95	75-90	70-85	50-65	25-35
	31-53	Gravelly sandy clay.	SC	A-7	30-40	75-90	70-85	60-80	35-50	45-55	20-30
	53	Unweathered bedrock.	-------	-------	-------	-------	-------	-------	-------	-------	-------
Hillery part	0-16	Silt loam	ML	A-4	0-5	100	95-100	85-95	70-90	20-30	NP-5
	16-60	Clay, cobbly clay.	CH, CL	A-7	10-30	85-100	80-100	70-95	60-85	40-55	15-30
Capulin: [1] CaD: Capulin part	0-9	Silt loam	CL, CL-ML	A-6, A-7, A-4	0-25	80-100	80-100	75-100	50-90	25-45	5-20
	9-35	Clay loam, silt loam, loam.	CL	A-7	0-25	80-100	80-100	75-100	50-85	40-50	15-25
	35-67	Loam, clay loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0-25	80-100	80-100	75-100	60-85	30-45	5-20
Ayon part	0-4	Cobbly silt loam.	ML, CL-ML	A-4	15-50	75-90	65-90	60-85	50-70	25-35	5-10
	4-60	Very stony loam, very cobbly loam.	ML, GM	A-4, A-2	40-80	50-90	45-90	40-80	30-60	20-35	NP-10
[1] CB: Capulin part	0-4	Silt loam	CL, CL-ML	A-6, A-7, A-4	0-25	80-100	80-100	75-100	50-90	25-45	5-20
	4-49	Clay loam, silt loam, loam.	CL	A-7	0-25	80-100	80-100	75-100	50-85	40-50	15-25

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
	49–67	Loam, clay loam, silty clay loam.	CL–ML	A–4, A–6, A–7	0–25	80–100	80–100	75–100	60–85	30–45	5–20
Torreon part	0–6	Silt loam	CL, ML	A–4	0–5	90–100	80–95	75–90	65–85	20–30	5–10
	6–11	Clay loam, silty clay loam.	CL	A–6	0–5	90–100	80–95	75–90	65–85	25–40	10–20
	11–62	Silty clay, clay.	CH, CL	A–7	0–5	80–100	75–90	70–90	60–80	40–55	15–35
Carnero: [1]CP: Carnero part	0–6	Loam	CL	A–6, A–7	0–5	85–100	75–100	75–100	55–80	30–45	10–20
	6–38	Clay, silty clay, clay loam.	CL, CH	A–7	0–5	85–100	80–100	80–100	60–95	40–55	15–30
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]CP: Partri part	0–3	Silt loam	ML, CL–ML	A–4	0	100	100	90–100	70–95	20–30	NP–10
	3–9	Clay loam, silty clay loam.	CL	A–6	0	100	100	90–100	70–80	30–40	10–25
	9–29	Clay, silty clay	CL	A–7	0	95–100	90–100	80–90	70–85	40–50	15–30
	29–60	Clay loam	CL	A–6	0	90–100	85–100	80–95	55–80	30–40	10–20
Dioxice part	0–9	Loam	CL	A–6	0	95–100	90–100	80–100	60–75	30–40	10–15
	9–17	Loam, clay loam.	ML, CL	A–4, A–6, A–7	0	95–100	90–100	85–100	60–85	30–45	5–20
	17–60	Loam, clay loam, sandy clay loam.	ML, CL, SC, SM	A–4, A–6, A–7	0–5	95–100	90–100	85–100	40–75	30–45	5–20
Colmor: CrB, CrC	0–9	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–90	25–35	5–15
	9–60	Silty clay loam, clay loam, silt loam.	CL	A–6	0	100	100	95–100	80–95	30–40	10–20
CsB, CsC	0–4	Silty clay loam	ML, CL	A–4, A–6	0	100	100	90–100	70–90	30–35	5–15
	4–60	Silty clay loam, clay loam, silt loam.	CL	A–6	0	100	100	95–100	80–95	30–40	10–20
[1]CT	0–4	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–90	25–35	5–15
	4–32	Silty clay loam, clay loam, silt loam.	CL	A–6	0	100	100	95–100	80–95	30–40	10–20
	32–52	Loam, silt loam	CL–ML, ML	A–4, A–6, A–7	0	100	100	90–100	60–85	25–45	5–15
	52–64	Silty clay loam, silt loam.	CL	A–6	0	100	100	95–100	80–95	30–40	10–20
[1]CV: Colmor part	0–22	Silt loam	ML, CL–ML	A–4, A–6	0	100	100	90–100	70–90	25–35	5–15
	22–60	Silty clay loam, clay loam, silt loam.	CL	A–6	0	100	100	95–100	80–95	30–40	10–20
Vermejo part	0–6	Silty clay loam	CL, ML	A–6, A–7	0	100	100	95–100	85–95	35–45	10–20
	6–60	Silty clay, clay	CL, CH	A–7	0	100	100	90–100	75–95	45–55	20–35

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Litle part	0–5	Silty clay	CL, CH	A–7	0	100	100	90–100	80–95	40–55	15–30
	5–31	Clay, silty clay, silty clay loam.	CL, CH	A–7	0	100	100	90–100	80–95	40–55	15–30
	31	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Cypher: [1] CY: Cypher part	0–4	Gravelly loam	GM, SM	A–1, A–2, A–4	0–5	55–85	50–80	35–70	15–50	20–30	NP–5
	4–19	Gravelly sandy loam, gravelly loam, very gravelly sandy loam.	GM	A–1, A–2	0–5	30–50	25–45	15–40	10–30	20–30	NP–5
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bundo part	0–43	Gravelly sandy loam.	SM, GM	A–1, A–2	10–20	40–75	35–70	20–50	10–30	---	NP
	43–64	Gravelly loam, very gravelly loam.	GM, SM	A–1, A–2	5–15	45–75	30–50	25–40	20–35	20–30	NP–5
[1] CY: Bundo part	64–96	Very gravelly sandy clay loam.	GC, GM–GC, SC, SM–SC	A–2	5–15	45–75	25–50	20–40	10–25	25–35	5–15
Dalhart: DaB, DaC	0–9	Fine sandy loam.	SM, ML	A–4	0	100	100	90–100	35–60	20–30	NP–5
	9–60	Sandy clay loam, clay loam.	SC, CL	A–6	0	100	100	90–100	40–80	30–40	10–20
[1] DB: Dalhart part	0–5	Fine sandy loam.	SM, ML	A–4	0	100	100	90–100	35–60	20–30	NP–5
	5–28	Sandy clay loam, clay loam.	SC, CL	A–6	0	100	100	90–100	40–80	30–40	10–20
	28–60	Fine sandy loam, sandy clay loam.	SM, SC, ML, CL	A–4, A–6	0	90–100	85–100	70–90	35–65	20–30	NP–5
Seelez part	0–36	Fine sandy loam.	SM	A–2, A–4	0	100	100	70–100	30–40	---	NP
	36–68	Loamy sand, fine sandy loam.	SM	A–2, A–4	0	100	100	60–100	20–40	---	NP
Dallam: DmB DmC2	0–10	Loamy fine sand.	SM	A–2	0	100	100	70–95	15–35	---	NP
	10–65	Sandy clay loam, clay loam.	CL, SC	A–6	0	100	100	85–100	45–70	25–35	10–20
DnB, DnB2	0–5	Fine sandy loam.	SM	A–2, A–4	0	100	100	80–100	30–50	20–25	NP–5
	5–75	Sandy clay loam, clay loam.	CL, SC	A–6	0	100	100	85–100	45–70	25–35	10–20

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Dargol:											
[1]DO:											
Dargol part	0–6	Stony loam	ML	A-4	5–15	90–100	70–90	65–85	50–65	20–30	NP–5
	6–35	Clay	CH, MH	A-7	5–15	90–100	70–100	65–90	60–80	50–60	20–35
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Stout part	0–3	Cobbly sandy loam.	SM	A-2	25–35	95–100	90–100	50–70	20–35	---	NP
	3–16	Cobbly fine sandy loam, cobbly sandy loam.	SM	A-2, A-4	30–40	95–100	90–100	55–75	30–45	---	NP
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Vamer part	0–4	Stony very fine sandy loam.	ML, SM	A-4	5–20	85–95	80–90	70–85	45–65	25–35	NP–15
	4–16	Clay	CL, CH	A-7	0–15	95–100	90–100	80–95	70–90	45–55	20–30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Deacon:											
[1]DP:											
Deacon part	0–16	Loam	ML, CL–ML	A-4	0–10	80–100	80–100	75–95	50–65	25–35	5–10
	16–44	Loam, clay loam.	CL–ML, CL	A-4, A-6	0–10	80–100	75–100	85–95	60–85	20–40	5–15
	44–60	Loam, clay loam.	CL–ML, CL, SM–SC, SC	A-4, A-6	0–10	75–100	75–100	70–90	40–65	20–40	5–15
Ayon part	0–6	Cobbly silt loam	ML, CL–ML	A-4	15–50	75–90	65–90	55–85	50–70	25–35	5–10
	6–60	Very stony loam, very cobbly loam.	ML, GM	A-4, A-2	40–80	50–90	45–90	40–80	30–60	20–35	NP–10
[1]DR:											
Deacon part	0–10	Loam	ML, CL–ML	A-4	0–10	80–100	80–100	75–95	50–65	25–35	5–10
	10–60	Loam, clay loam.	CL–ML, CL	A-4, A-6	0–10	80–100	75–100	85–95	60–85	20–40	5–15
[1]DR:											
La Brier part	0–7	Silt loam	ML	A-4, A-6	0	100	100	95–100	70–85	30–40	5–15
	7–35	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	95–100	85–100	40–55	15–30
	35–60	Silty clay loam	ML, CL	A-7	0	100	100	95–100	85–100	40–50	10–25
Manzano part	0–8	Loam	CL–ML	A-4	0	100	100	85–100	60–80	20–30	5–10
	8–68	Loam, clay loam.	CL, CL–ML	A-4, A-6	0	100	100	85–100	60–85	25–40	5–15
[1]DsE:											
Deacon part	0–10	Loam	ML, CL–ML	A-4	0–10	80–100	80–100	75–95	50–65	25–35	5–10
	10–60	Loam, clay loam.	CL–ML, CL	A-4, A-6	0–10	80–100	75–100	85–95	60–85	20–40	5–15
Oro Grande part	0–7	Gravelly loam	GM	A-2, A-4	5–25	45–65	40–60	35–55	25–45	20–30	NP–5
	7	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Laporte part	0–15	Channery loam	ML, GM	A-4	0–15	50–90	50–75	45–70	35–60	20–30	NP–5
	15	Weathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Des Moines:											
[1] DT	0–8	Stony silt loam	CL–ML, CL	A–4, A–6	20–75	60–95	55–85	50–80	50–75	25–40	5–15
	8–12	Very cobbly silty clay loam, stony silty clay loam.	CL	A–6	20–75	60–95	55–70	50–65	50–60	30–40	10–15
	12–60	Very stony silty clay, stony clay.	CH, CL, GC	A–7	40–80	60–95	55–70	45–65	40–60	40–60	15–35
Dioxice:											
DxC, DxC2	0–8	Fine sandy loam.	SM, ML	A–4	0	95–100	90–100	75–95	35–55	25–35	NP–10
	8–34	Loam, clay loam.	ML, CL	A–4, A–6, A–7	0	95–100	90–100	85–100	60–85	30–45	5–20
	34–60	Loam, clay loam, sandy clay loam.	ML, CL, SC, SM	A–4, A–6, A–7	0–5	95–100	90–100	85–100	40–75	30–45	5–20
Etoe:											
[1] EE:											
Etoe part	0–11	Loam	ML	A–4	0–10	100	95–100	75–95	50–70	20–30	NP–5
	11–36	Cobbly loam	SM	A–2, A–4	15–40	65–85	60–80	55–75	30–45	20–30	NP–5
	36–73	Very cobbly sandy clay loam.	GC, GW–GC	A–2	40–55	25–35	15–30	10–25	5–15	20–35	5–15
Etown part	0–4	Gravelly loam	ML, SM,	A–4	10–25	65–80	60–75	50–75	35–55	20–30	NP–5
	4–18	Gravelly loam, very gravelly loam.	GM, GM–GC	A–2, A–4, A–1	10–25	35–65	30–60	30–50	20–45	20–30	NP–10
	18–30	Gravelly clay loam, very gravelly clay loam, gravelly sandy clay loam.	GC	A–2, A–6	15–40	35–65	30–60	30–55	15–50	30–40	10–20
	30–60	Very gravelly clay, very cobbly clay, very gravelly clay loam.	GC, CL, CH	A–2, A–6, A–7	30–55	50–80	45–75	40–70	30–60	35–55	15–30
Frolic:											
[1] FC:											
Frolic part	0–15	Very fine sandy loam.	ML	A–4	0	100	100	85–95	50–70	20–30	NP–5
	15–35	Loam, sandy clay loam.	SM–SC, SC, CL–ML, CL	A–4, A–6	0	100	100	85–95	45–70	20–35	5–15
	35–42	Fine sandy loam.	SM	A–2, A–4	0	100	100	70–80	30–40	20–30	NP–5
	42–60	Silt	ML	A–4	0	100	100	100	90–100	20–30	NP–5
Cumulic Haplaquolls part	0–60	Variable	---	---	---	---	---	---	---	---	---
Fuera:											
[1] FD:											
Fuera part	0–18	Cobbly loam	ML	A–4	25–35	85–95	80–90	70–80	50–60	20–30	NP–5
	18–30	Clay, cobbly clay.	CL, CH	A–7	5–30	85–95	80–90	75–85	60–80	40–55	20–30
	30–43	Stony silty clay, cobbly clay, very cobbly clay.	CL, CH	A–7	20–65	70–80	65–75	55–70	50–65	40–55	20–30

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
	43–60	Stony clay loam, very cobbly clay, very stony clay.	CL, CH	A–6, A–7	20–70	70–80	65–75	55–70	50–65	35–55	15–30
Burnac part	0–12	Stony loam	ML, CL–ML	A–4	25–35	95–100	90–95	75–90	55–75	25–35	5–10
	12–34	Clay, silty clay	CH	A–7	0	90–100	85–95	75–90	70–85	50–65	25–35
	34–42	Gravelly sandy clay.	GC	A–7	10–20	60–75	60–75	60–70	35–50	45–55	20–30
	42	Unweathered bedrock.									
[1] FE: Fuera part	0–15	Cobbly loam	ML	A–4	25–35	85–95	80–90	70–80	50–60	20–30	NP–5
	15–31	Clay, cobbly clay.	CL, CH	A–7	5–30	85–95	80–90	75–85	60–80	40–55	20–30
	31–58	Stony silty clay, cobbly clay, very cobbly clay.	CL, CH	A–7	20–65	70–80	65–75	55–70	50–65	40–55	20–30
	58–64	Stony clay loam, very cobbly clay, very stony clay.	CL, CH	A–6, A–7	20–70	70–80	65–75	55–70	50–65	35–55	15–30
Dargol part	0–6	Stony loam	ML	A–4	5–15	90–100	70–90	65–85	50–65	20–30	NP–5
	6–30	Clay	CH, MH	A–7	5–15	90–100	70–100	65–90	60–80	50–60	20–35
	30	Unweathered bedrock.									
Vamer part	0–4	Stony loam	ML	A–4	5–20	85–95	80–90	70–85	50–65	25–35	NP–10
	4–16	Clay	CL, CH	A–7	0–15	95–100	90–100	80–95	70–90	45–55	20–30
	16	Unweathered bedrock.									
Gruver: GaB	0–5	Fine sandy loam.	SM, ML	A–4	0	100	95–100	75–90	40–55	20–30	NP–5
	5–34	Clay loam	CL	A–6, A–7	0	100	95–100	90–100	70–95	35–50	15–30
	34–66	Clay loam, sandy clay loam.	CL, SC	A–6, A–7	0	95–100	90–100	85–100	40–85	25–45	10–25
GbB	0–9	Loam	CL–ML, CL	A–4, A–6	0	100	95–100	85–100	55–80	25–35	5–15
	9–35	Clay loam	CL	A–6, A–7	0	100	95–100	90–100	70–95	35–50	15–30
		Clay loam, sandy clay loam.	CL, SC	A–6, A–7	0	95–100	90–100	85–100	40–85	25–45	10–25
GcB2	0–11	Clay loam	CL	A–6	0	100	95–100	85–100	55–80	30–40	10–20
	11–51	Clay loam	CL	A–6, A–7	0	100	95–100	90–100	70–95	35–50	15–30
	51–65	Clay loam, sandy clay loam.	CL, SC	A–6, A–7	0	95–100	90–100	85–100	40–85	25–45	10–25
Hillery: HrD	0–18	Stony loam	ML	A–4	5–20	90–100	85–100	75–95	60–75		NP
	18–60	Clay, cobbly clay.	CH, CL	A–7	10–30	85–100	80–100	70–95	60–85	40–55	15–30
La Brier: Lb	0–10	Silt loam	ML	A–4, A–6	0	100	100	95–100	70–85	30–40	5–15
	10–29	Silty clay loam, clay loam, clay.	CL, CH	A–7	0	100	100	95–100	85–100	40–55	15–30
	29–62	Silty clay loam	ML, CL	A–7	0	100	100	95–100	85–100	40–50	10–25

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lc	0–4	Silty clay loam	CL	A–7	0	100	100	90–100	80–95	40–50	15–25
	4–35	Clay	CL, CH	A–7	0	100	100	90–100	80–95	45–55	20–30
	35–60	Silty clay loam	CL	A–7	0	100	100	90–100	80–95	40–50	15–25
[1] Lr: La Brier part	0–10	Silt loam	ML	A–4, A–6	0	100	100	95–100	70–85	30–40	5–15
	10–35	Silty clay loam, clay loam, clay.	CL, CH	A–7	0	100	100	95–100	85–100	40–55	15–30
	35–60	Silty clay loam	ML, CL	A–7	0	100	100	95–100	85–100	40–50	10–25
Rock outcrop part.											
Laporte: LSF	0–10	Channery loam	ML, GM	A–4	0–10	50–90	50–75	45–70	35–60	20–30	NP–5
	10	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Litle: LtB	0–4	Clay loam	CL	A–6, A–7	0	100	100	90–100	70–80	30–45	10–20
	4–23	Clay, silty clay, silty clay loam.	CL, CH	A–7	0	100	100	90–100	80–95	40–55	15–30
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Manzano: Ma	0–20	Loam	CL–ML	A–4	0	100	100	85–100	60–80	20–30	5–10
	20–60	Loam, clay loam.	CL–ML, CL	A–4, A–6	0	100	100	85–100	60–85	25–40	5–15
[1] MB: Manzano part	0–6	Loam	CL–ML	A–4	0	100	100	85–100	60–80	20–30	5–10
	6–60	Loam, clay loam.	CL, CL–ML	A–4, A–6	0	100	100	85–100	60–85	25–40	5–15
Manzano part	0–27	Fine sandy loam.	SM, ML	A–4	0	100	100	70–85	40–55	---	NP
	27–64	Loam, clay loam.	CL, CL–ML	A–4, A–6	0	100	100	85–100	60–85	25–40	5–15
Midnight: [1] Mn: Midnight part	0–12	Stony clay loam.	GC	A–2, A–6	10–20	35–65	25–55	20–50	15–45	30–40	10–20
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rombo part	0–20	Cobbly silty clay loam.	CL	A–7, A–6	25–35	85–95	80–90	75–90	70–85	35–45	15–20
	20–30	Cobbly clay	CH, CL	A–7	25–35	85–95	80–90	75–90	60–85	45–70	20–40
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1] Mn: Rock outcrop part.											
Mion: MoB	0–4	Silty clay loam	CL	A–6	0	100	100	90–100	85–95	30–40	10–15
	4–16	Silty clay, clay	CL, CH	A–7	0	100	100	90–100	75–95	40–55	15–25
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1] Mp: Mion part	0–4	Silty clay loam	CL	A–6	0	100	100	90–100	65–95	30–40	10–15
	4–17	Silty clay, clay	CL, CH	A–7	0	100	100	90–100	75–95	40–55	15–25
	17	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
[1] MR:											
Mion part	0–4	Silt loam	ML	A–4	0	100	100	90–100	65–95	30–40	5–10
	4–14	Silty clay, clay	CL, CH	A–7	0	100	100	90–100	75–95	40–55	15–25
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Litle part	0–10	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	90–100	75–90	25–40	5–15
	10–29	Clay, silty clay, silty clay loam.	CL, CH	A–7	0	100	100	90–100	80–95	40–55	15–30
	29	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Moreno:											
[1] MS:											
Moreno part	0–8	Loam	ML, CL–ML	A–4	5–10	95–100	90–95	75–90	55–70	25–35	5–10
	8–37	Clay loam, gravelly clay.	CL	A–6, A–7	5–15	95–100	70–95	60–90	50–75	35–50	15–25
	37–60	Gravelly clay, gravelly sandy clay, gravelly clay loam.	CL, CH, SC	A–7	10–20	80–90	60–70	50–65	35–55	40–55	20–30
Cypher part	0–2	Gravelly loam	GM, SM	A–1, A–2, A–4	0–5	55–85	50–80	35–70	15–50	20–30	NP–5
	2–14	Gravelly sandy loam, gravelly loam, very gravelly sandy loam.	GM	A–1, A–2	0–5	30–50	25–45	15–40	10–30	20–30	NP–5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Morval:											
[1] MT:											
Morval part	0–21	Clay loam	CL	A–6	0–5	90–100	85–100	80–95	60–75	30–40	10–15
	21–57	Silty clay loam	CL	A–6	0–10	75–100	70–100	65–95	60–80	30–40	10–15
	57–60	Gravelly sandy clay loam, very gravelly sandy clay loam.	GC	A–2	15–20	45–65	40–60	35–50	15–30	30–40	10–15
Moreno part	0–8	Loam	ML, CL–ML	A–4	5–10	95–100	90–95	75–90	55–70	25–35	5–10
	8–37	Clay loam, gravelly clay.	CL	A–6, A–7	5–15	95–100	70–95	60–90	50–75	35–50	15–25
	37–60	Gravelly clay, gravelly sandy clay, gravelly clay loam.	CL, CH, SC	A–7	10–20	80–90	60–70	50–65	35–55	40–55	20–30
Mughouse:											
[1] Mu:											
Mughouse part	0–4	Stony sandy clay loam.	SC, CL	A–6	25–30	80–100	75–100	60–85	35–55	30–35	10–15
	4–38	Stony clay loam, cobbly clay.	CL, CH, SC	A–6, A–7	25–55	75–90	70–90	65–90	45–80	30–55	10–30
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Swastika part	0–4	Silt loam	ML	A–4	0	100	100	90–100	70–90	25–35	NP–10
	4–11	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	11–64	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number—				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Oro Grande:											
[1] OG:											
Oro Grande part	0–12	Very stony loam.	GM	A–2, A–4	5–60	45–65	40–60	35–55	25–45	20–30	NP–5
	12	Unweathered bedrock.									
Meloche part	0–9	Stony silty clay loam.	CL, CL–ML	A–4, A–6	30–70	90–100	85–95	75–90	60–85	25–40	5–15
	9–56	Clay, silty clay	CH, CL	A–7	0–15	95–100	90–100	80–95	70–85	45–55	20–30
	56	Weathered bedrock.									
[1] OT:											
Oro Grande part	0–11	Gravelly loam	GM	A–2, A–4	5–60	45–65	40–60	35–55	25–45	20–30	NP–5
	11	Unweathered bedrock.									
Tafoya part	0–14	Stony loam	ML, GM	A–4	20–60	65–85	60–80	55–75	35–65	20–30	NP–5
	14–39	Very gravelly clay, very gravelly silty clay.	GC	A–2	10–20	20–40	15–35	10–35	10–30	45–55	20–30
	39–46	Gravelly sandy clay loam, gravelly clay, very gravelly clay loam.	GC	A–2	15–25	40–60	35–55	30–50	15–30	35–45	15–25
	46	Unweathered bedrock.									
Penrose:											
PE	0–11	Loam	ML, CL–ML	A–4	0–10	90–100	75–95	60–90	50–85	25–35	5–10
	11	Weathered bedrock.									
Plack:											
PL	0–10	Fine sandy loam.	SM, ML	A–4	0–5	90–100	90–100	70–80	35–55	20–25	NP–5
	10	Indurated									
Ponil:											
[1] PV:											
Ponil part	0–4	Stony loam	ML	A–4	20–30	100	95–100	80–95	55–75	25–35	NP–10
	4–60	Clay, silty clay	CH, CL	A–7	10–20	100	95–100	85–95	70–90	45–60	20–30
Vamer part	0–3	Stony loam	ML	A–4	5–20	85–95	80–90	70–85	50–65	25–35	NP–10
	3–13	Clay	CL, CH	A–7	0–15	95–100	90–100	80–95	70–90	45–55	20–30
	13	Unweathered bedrock.									
Raton:											
[1] Ra:											
Raton part	0–9	Stony silt loam	CL, CL–ML	A–6, A–4	30–70	85–95	80–90	75–90	55–80	25–35	5–15
	9–15	Very stony clay.	CH, CL	A–7	50–70	85–95	80–90	75–90	65–85	45–55	20–30
	15	Unweathered bedrock.									
[1] Ra:											
Barela part	0–4	Stony silt loam	ML, CL–ML	A–4	5–15	95–100	90–100	80–100	65–90	25–35	5–10
	4–12	Silty clay, silty clay loam.	ML, CL	A–6	0–15	95–100	90–100	80–100	70–95	35–40	10–20
	12–31	Stony clay	CH, CL	A–7	10–30	95–100	90–100	80–100	70–90	45–60	20–35
	31–41	Very stony clay	CH, CL	A–7	25–65	85–95	75–85	70–85	55–80	45–60	20–35
	41	Unweathered bedrock.									

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
[1] RD: Raton part	0-8	Stony silt loam	CL, CL-ML	A-6, A-4	30-70	85-95	80-90	75-90	55-80	25-35	5-15
	8-13	Very stony clay	CH, CL	A-7	50-70	85-95	80-90	75-90	65-85	45-55	20-30
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dalcan part	0-4	Stony silt loam	CL-ML, ML	A-4	25-50	75-95	70-90	65-85	50-80	25-35	5-10
	4-34	Very cobbly clay, very cobbly clay loam, very stony clay.	CL, CH	A-6, A-7	40-70	85-95	80-90	75-85	50-80	30-55	10-30
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1] RE: Raton part	0-9	Stony silt loam	CL, CL-ML	A-6, A-4	30-70	85-95	80-90	75-90	55-80	25-35	5-15
	9-15	Very stony clay	CH, CL	A-7	50-70	85-95	80-90	75-90	65-85	45-55	20-30
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wellsville part	0-6	Cobbly loam	ML, CL-ML	A-4	25-30	85-100	80-95	75-90	50-70	25-35	5-10
	6-32	Cobbly clay loam, cobbly sandy clay loam, gravelly sandy clay loam.	SC, SM, CL, CL-ML, SC, SM-SC	A-4, A-6	10-30	80-100	70-95	65-90	35-75	25-40	5-15
	32-60	Cobbly sandy clay loam, cobbly loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	25-30	85-100	80-95	70-90	35-70	25-35	5-15
Ring: [1] RG: Ring part	0-6	Cobbly loam	ML, CL-ML	A-4	10-40	95-100	95-100	80-95	55-75	20-30	NP-10
	6-14	Cobbly sandy clay, stony sandy clay.	SC, CL	A-7, A-6	25-40	95-100	90-95	75-90	40-55	35-50	15-25
	14-39	Cobbly sandy clay, very cobbly sandy clay, very stony sandy clay.	SC, CL	A-7, A-6	45-70	90-95	85-90	70-85	40-55	35-50	15-25
	39-60	Cobbly sandy clay loam, very cobbly sandy clay loam, very stony sandy clay loam.	SC	A-6, A-2	50-70	90-95	85-90	70-80	30-50	30-40	10-15
Brycan part	0-9	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	9-60	Sandy clay loam.	SM-SC, CL-ML, CL, SC	A-4, A-6	0-10	95-100	90-100	75-90	35-55	25-35	5-15
Riverwash: RV.											

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
[1] Rz: Riverwash part.											
Manzano part	0–9	Loam	CL–ML	A–4	0	100	100	85–100	60–80	20–30	5–10
	9–60	Loam, clay loam.	CL–ML, CL	A–4, A–6	0	100	100	85–100	60–85	25–40	5–15
Saladon: SaC	0–4	Mucky silty clay.	OL, OH	A–7	0	100	100	95–100	90–95	45–60	15–25
	4–60	Clay	CH	A–7	0	95–100	90–100	85–100	70–95	50–70	25–40
Seelez: SeB	0–36	Sandy loam	SM	A–2, A–4	0	100	100	70–100	30–40	---	NP
	36–60	Loamy sand, fine sandy loam.	SM	A–2, A–4	0	100	100	60–100	20–40	---	NP
SfC, SnA	0–16	Fine sandy loam.	SM	A–2, A–4	0	100	100	60–100	30–40	---	NP
	16–60	Loamy sand, fine sandy loam.	SM	A–2, A–4	0	100	100	60–100	20–40	---	NP
Swastika: SoA, SpD	0–6	Silt loam	ML	A–4	0	100	100	90–100	70–90	25–35	NP–10
	6–33	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	33–60	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30
SsB	0–4	Silty clay loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	80–90	25–35	5–15
	4–9	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	9–42	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30
	42–60	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
St	0–3	Silty clay loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	80–90	25–35	5–15
	3–8	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	8–42	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30
	42–60	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
[1] SW	0–4	Silt loam	ML	A–4	0	100	100	90–100	70–90	25–35	NP–10
	4–11	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	11–30	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30
	30–64	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
[1] SX: Swastika part	0–2	Silt loam	ML	A–4	0	100	100	90–100	70–90	25–35	NP–10
	2–29	Silty clay loam	CL	A–6	0	100	100	95–100	85–95	30–40	10–20
	29–60	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–95	35–55	15–30
La Brier part	0–3	Silty clay loam	CL	A–7	0	100	100	90–100	80–95	40–50	15–25
	3–60	Clay	CL, CH	A–7	0	100	100	90–100	80–95	45–55	20–30
Texline: TED	0–5	Fine sandy loam.	SM, ML	A–4	0	100	100	75–90	40–60	<30	NP–5
	5–42	Loam, clay loam.	CL	A–6, A–7	0	100	95–100	90–100	55–80	30–45	10–25
	42–66	Loam, sandy clay loam, gravelly sandy clay loam.	CL–ML, CL, SM–SC, SC	A–6, A–4	0	80–100	75–100	60–100	35–70	25–40	5–20

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Thunderbird:											
[1]TH:											
Thunderbird part	0–4	Stony silt loam, stony clay.	CL, ML	A-6, A-4	5–30	75–85	70–80	65–75	50–65	30–40	5–20
	4–24	Gravelly clay	CH	A-7	5–10	95–100	90–95	85–90	80–90	55–65	30–40
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Torreon part	0–4	Silt loam	CL–ML	A-4	0–5	90–100	80–95	75–90	65–85	20–30	5–10
	4–11	Clay loam, silty clay loam.	CL	A-6	0–5	90–100	80–95	75–90	65–85	25–40	10–20
	11–60	Silty clay, clay	CH, CL	A-7	0–5	80–100	75–90	70–90	60–80	40–55	15–35
Tinaja:											
TNE	0–6	Gravelly sandy clay loam.	SM	A-2, A-4	0–5	70–90	60–75	45–70	25–50	20–30	NP–5
	6–41	Very gravelly sandy clay loam, gravelly sandy clay loam, very gravelly loam.	GM, SM	A-2, A-1	0–5	50–70	30–55	25–50	10–35	20–30	NP–5
	41–60	Very gravelly loamy sand, very gravelly sand, very gravelly sandy loam.	GP, GP–GM	A-1	0–5	20–45	15–35	5–20	0–10	---	NP
Torreon:											
[1]TO:											
Torreon part	0–4	Silt loam	CL–ML	A-4	0–5	90–100	80–95	75–90	65–85	20–30	5–10
	4–9	Clay loam, silty clay loam.	CL	A-6	0–5	90–100	80–95	75–90	65–85	25–40	10–20
	9–62	Silty clay, clay	CH, CL	A-7	0–5	80–100	75–90	70–90	60–80	40–55	15–35
Deacon part	0–3	Loam	ML, CL–ML	A-4	0–10	80–100	80–100	75–95	50–65	25–35	5–10
	3–22	Loam, clay loam.	CL–ML, CL	A-4, A-6	0–10	80–100	75–100	85–95	60–85	20–40	5–15
	22–60	Loam, clay loam.	CL–ML, CL, SM–SC, SC	A-4, A-6	0–10	75–100	75–100	70–90	40–65	20–40	5–15
Travessilla:											
[1]Tr:											
Travessilla part	0–9	Stony loam	SM	A-4	10–20	65–100	55–95	40–65	35–50	---	NP
	9	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]TS:											
Travessilla part	0–11	Fine sandy loam.	SM	A-2, A-4	0–5	85–100	80–95	60–70	25–40	---	NP
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bernal part	0–18	Sandy clay loam.	SC, CL, SM–SC, CL–ML	A-6, A-4	0	100	100	85–95	45–60	25–35	5–15
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

TABLE 10.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Tricon:											
[1] TX:											
Tricon part	0-4	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-90	20-35	5-15
	4-23	Clay loam, clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	15-30
	23	Indurated	---	---	---	---	---	---	---	---	---
Plack part	0-9	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	90-100	70-95	50-75	20-35	5-15
	9	Indurated	---	---	---	---	---	---	---	---	---
Ustochrepts:											
[1] US:											
Ustochrepts part	0-43	Variable	---	---	---	---	---	---	---	---	---
	43	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Vermejo:											
Ve, Vm	0-2	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-45	10-20
	2-60	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-35
[1] Vs2:											
Vermejo part	0-2	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-45	10-20
	2-60	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-35
Swastika part	0-2	Silt loam	ML	A-4	0	100	100	90-100	70-90	25-35	NP-10
	2-26	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	26-60	Silty clay	CL, CH	A-6, A-7	0	100	100	95-100	90-95	35-55	15-30
Wellsville:											
WEG	0-10	Cobbly loam	ML, CL-ML	A-4	25-30	85-100	80-95	75-90	50-70	25-35	5-10
	10-32	Cobbly clay loam, sandy clay loam, clay loam.	CL	A-6, A-7	0-15	85-100	80-95	75-90	60-75	30-45	10-20
	32-60	Sandy clay loam, loam, clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0-15	85-100	80-95	70-90	45-70	25-35	5-15

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25° C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is largely affected by the quality of the irrigation water and the irrigation practices. Hence, the salinity of individual fields can differ greatly from the value given in table 11. Salinity affects the suitability of a soil for

TABLE 11.—*Physical and chemical properties of soils*

[Dashes indicate data were not available. The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Abreu:											
[1] AB:											
Abreu part	0–15	0.6–2.0	0.11–0.15	5.6–6.5	<2	Low	Moderate	Moderate	0.24	3	---
	15–43	0.2–0.6	0.06–0.13	6.1–6.5	<2	Moderate	Moderate	Low	0.24		
	43	---	---	---	---	---	---	---	---		
Cypher part	0–4	0.6–2.0	0.06–0.13	5.6–6.5	<2	Low	Moderate	Moderate	0.20	1	7
	4–18	2.0–6.0	0.05–0.10	5.6–6.0	<2	Low	Moderate	Moderate	0.32		
	18	---	---	---	---	---	---	---	---		
Angostura:											
[1] AG:											
Angostura part	0–26	0.6–2.0	0.07–0.13	5.6–6.0	<2	Low	Moderate	Moderate	0.15	5	---
	26–60	0.6–2.0	0.07–0.11	5.1–6.0	<2	Low	Moderate	Moderate	0.10		
Angostura part	0–7	0.6–2.0	0.07–0.13	5.6–6.0	<2	Low	Moderate	Moderate	0.15	5	---
	7–22	0.6–2.0	0.07–0.11	5.1–6.0	<2	Low	Moderate	Moderate	0.10		
	22–60	0.6–2.0	0.01–0.08	5.1–6.0	<2	Low	Moderate	Moderate	0.15		
[1] AN:											
Angostura part	0–12	0.6–2.0	0.07–0.13	5.6–6.0	<2	Low	Moderate	Moderate	0.15	5	---
	12–17	0.6–2.0	0.07–0.11	5.1–6.0	<2	Low	Moderate	Moderate	0.10		
	17–65	0.6–2.0	0.01–0.08	5.1–6.0	<2	Low	Moderate	Moderate	0.15		
Tolby part	0–22	2.0–6.0	0.08–0.10	<4.5	<2	Low	High	High	0.20	3	---
	22–44	6.0–20	0.05–0.07	4.5–5.5	<2	Low	High	High	0.17		
	44–57	6.0–20	0.07–0.09	5.1–5.5	<2	Low	High	High	0.15		
	57–80	6.0–20	0.04–0.06	5.6–6.0	<2	Low	Moderate	Moderate	0.15		
Apache:											
[1] ApD:											
Apache part	0–17	0.6–2.0	0.12–0.16	7.9–8.4	<2	Low	High	Low	0.28	1	8
	17	---	---	---	---	---	---	---	---		
Ayon part	0–6	0.6–2.0	0.14–0.16	7.4–8.4	<2	Low	High	Low	0.24	5	8
	6–60	0.6–2.0	0.10–0.15	7.4–8.4	<2	Low	High	Low	0.24		
Aridic Argiustolls:											
[1] ARF, ARG:											
Aridic Argiustolls part	0–10	0.6–2.0	0.06–0.09	6.1–7.8	<2	Low	Moderate	Low	0.15	3	---
	10–30	0.06–0.6	0.06–0.09	7.3–8.4	<2	Moderate	High	Low	0.10		
	30	---	---	---	---	---	---	---	---		
Rock outcrop part.											
Bandera:											
[1] BA:											
Bandera part	0–19	0.6–2.0	0.10–0.16	7.4–8.4	<2	Low	High	Low	0.20	2	---
	19–60	6.0–20	0.03–0.07	7.4–8.4	<2	Low	High	Low	0.10		
Cinder land part.											
Barela:											
[1] BE:											
Barela part	0–4	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.32	4	5
	4–12	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37		
	12–31	0.06–0.2	0.11–0.13	6.6–7.3	<2	High	High	Low	0.24		
	31–41	0.06–0.2	0.07–0.08	7.4–8.4	<2	High	High	Low	0.20		
	41	---	---	---	---	---	---	---	---		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Barela part	0–4	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.28	4	5
	4–10	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37		
	10–28	0.06–0.2	0.11–0.13	6.6–7.3	<2	High	High	Low	0.24		
	28–42	0.06–0.2	0.07–0.08	7.4–8.4	<2	High	High	Low	0.20		
	42										
[1] BE: Yankee part	0–9	0.6–2.0	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.32	5	6
	9–60	0.06–0.2	0.14–0.16	6.6–8.4	<2	High	High	Low	0.28		
Berthoud: BhD	0–11	0.6–2.0	0.15–0.20	7.4–8.4	<2	Low	Moderate	Low	0.37	5	5
	11–64	0.6–2.0	0.12–0.20	7.4–8.4	<2	Moderate	High	Low	0.32		
Brycan: [1] BR: Brycan part	0–8	0.6–2.0	0.15–0.18	7.4–7.8	<2	Low	High	Low	0.32	5	5
	8–60	0.6–2.0	0.14–0.19	7.4–7.8	<2	Moderate	High	Low	0.20		
Brycan part	0–14	0.6–2.0	0.15–0.18	7.4–7.8	<2	Low	High	Low	0.32	5	5
	14–54	0.6–2.0	0.14–0.19	7.4–7.8	<2	Moderate	High	Low	0.20		
	54–60	0.2–0.6	0.16–0.19	7.4–8.4	<2	Moderate	High	Low	0.37		
Bundo: [1] BU	0–30	2.0–6.0	0.08–0.10	5.1–6.0	<2	Low	Moderate	Moderate	0.24	5	------
	30–56	2.0–6.0	0.10–0.12	5.6–6.5	<2	Low	Moderate	Moderate	0.20		
	56–80	2.0–6.0	0.08–0.10	5.6–6.5	<2	Low	Moderate	Moderate	0.10		
Burnac: [1] BY: Burnac part	0–12	0.6–2.0	0.16–0.18	6.1–6.5	<2	Moderate	Moderate	Low	0.28	3	------
	12–31	<0.06	0.14–0.16	6.1–7.3	<2	High	High	Low	0.32		
	31–53	0.06–0.2	0.12–0.14	6.6–7.8	<2	High	High	Low	0.32		
	53										
Hillery part	0–16	0.6–2.0	0.16–0.21	5.6–7.3	<2	Low	Moderate	Moderate	0.32	4	6
	16–60	<0.06	0.11–0.16	5.6–7.3	<2	High	High	Moderate	0.24		
Capulin: [1] CaD: Capulin part	0–9	0.6–2.0	0.12–0.21	7.4–7.8	<2	Moderate	High	Low	0.28	3	4L
	9–35	0.6–2.0	0.12–0.21	7.9–8.4	<2	Moderate	High	Low	0.24		
	35–67	0.6–2.0	0.08–0.21	7.4–9.0	<4	Moderate	High	Low	0.20		
Ayon part	0–4	0.6–2.0	0.14–0.16	7.4–8.4	<2	Low	High	Low	0.24	5	8
	4–60	0.6–2.0	0.10–0.15	7.4–8.4	<2	Low	High	Low	0.24		
[1] CB: Capulin part	0–4	0.6–2.0	0.12–0.21	7.4–7.8	<2	Moderate	Moderate	Low	0.28	3	4L
	4–49	0.6–2.0	0.12–0.21	7.9–8.4	<2	Moderate	High	Low	0.24		
	49–67	0.6–2.0	0.08–0.21	7.4–9.0	<4	Moderate	High	Low	0.20		
Torreon part	0–6	0.6–2.0	0.16–0.21	6.6–7.3	<2	Low	Moderate	Low	0.28	5	6
	6–11	0.2–0.6	0.19–0.21	6.6–7.8	<2	Moderate	Moderate	Low	0.24		
	11–62	0.06–0.2	0.14–0.18	6.6–8.4	<2	High	High	Low	0.24		
Carnero: [1] CP: Carnero part	0–6	0.2–0.6	0.17–0.19	6.6–7.8	<2	Moderate	Moderate	Low	0.24	2	5
	6–38	0.06–0.2	0.13–0.20	6.6–8.4	<2	High	High	Low	0.24		
	38										
Partri part	0–3	0.6–2.0	0.16–0.21	6.1–7.3	<2	Low	Moderate	Low	0.37	5	6
	3–9	0.2–0.6	0.19–0.21	6.1–7.3	<2	Moderate	Moderate	Low	0.32		
	9–29	0.06–0.2	0.14–0.16	6.1–7.3	<2	High	High	Low	0.28		
	29–60	0.2–0.6	0.15–0.17	7.9–8.4	<2	Moderate	High	Low	0.28		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Dioxice part	0-9	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	High	Low	0.32	3	4L
	9-17	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	High	Low	0.37		
	17-60	0.2-2.0	0.08-0.16	7.9-8.4	<2	Moderate	High	Low	0.37		
Colmor:											
CrB, CrC	0-9	0.2-0.6	0.19-0.21	7.4-7.8	<2	Moderate	Moderate	Low	0.37	5	4L
	9-60	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	High	Low	0.49		
CsB, CsC	0-4	0.2-0.6	0.19-0.21	7.4-7.8	---	Moderate	Moderate	Low	0.37	5	4L
	4-60	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	High	Low	0.49		
[1] CT	0-4	0.2-0.6	0.19-0.21	7.4-7.8	<2	Moderate	Moderate	Low	0.37	5	4L
	4-32	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	High	Low	0.49		
	32-52	0.2-2.0	0.16-0.18	7.9-8.4	<2	Low	High	Low	0.43		
	52-64	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	High	Low	0.49		
[1] CV:											
Colmor part	0-22	0.2-0.6	0.19-0.21	7.4-7.8	<2	Moderate	Moderate	Low	0.37	5	4L
	22-38	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	High	Low	0.49		
	38-60	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	High	Low	0.49		
Vermejo part	0-6	0.2-0.6	0.19-0.21	7.9-9.0	>2	Moderate	High	High	0.28	5	4L
	6-60	<0.2	0.15-0.17	7.9-9.0	>2	High	High	High	0.32		
Litle part	0-5	0.06-0.2	0.14-0.16	7.4-8.4	<4	High	High	Moderate	0.32	3	4
	5-31	0.06-20.2	0.12-0.16	7.9-8.4	2-8	High	High	Moderate	0.32		
	31	---	---	---	---	---	---	---	---		
Cypher:											
[1] CY:											
Cypher part	0-4	0.6-0.2	0.06-0.13	6.1-6.5	<2	Low	Moderate	Moderate	0.20	1	7
	4-19	2.0-6.0	0.05-0.10	5.6-6.0	<2	Low	Moderate	Moderate	0.32		
	19	---	---	---	---	---	---	---	---		
Bundo part	0-43	2.0-6.0	0.08-0.10	5.1-6.0	<2	Low	Moderate	Moderate	0.24	5	---
	43-64	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low	Moderate	Moderate	0.20		
	64-96	2.0-6.0	0.08-0.10	5.6-6.5	<2	Low	Moderate	Moderate	0.10		
Dalhart:											
DaB, DaC	0-9	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.24	5	3
	9-60	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	---		
[1] DB:											
Dalhart part	0-5	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.24	5	3
	5-28	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	---		
	28-60	2.0-6.0	0.12-0.16	7.9-8.4	<2	Low	High	Low	---		
Seelez part	0-36	6.0-20	0.11-0.13	7.4-8.4	<2	Low	High	Low	0.20	5	3
	36-68	6.0-20	0.06-0.08	7.4-8.4	<2	Low	High	Low	0.20		
Dallam:											
DmB, DmC2	0-10	2.0-6.0	0.06-0.10	7.4-7.8	<2	Low	Moderate	Low	0.20	5	2
	10-65	0.6-2.0	0.12-0.18	7.4-8.4	<2	Moderate	High	Low	0.32		
DnB, DnB2	0-5	2.0-6.0	0.11-0.15	7.4-7.8	<2	Low	Moderate	Low	0.24	5	3
	5-75	0.6-2.0	0.12-0.18	7.4-8.4	<2	Moderate	High	Low	0.32		
Dargol:											
[1] DO:											
Dargol part	0-6	0.6-2.0	0.13-0.15	5.6-6.5	<2	Low	Moderate	Moderate	0.24	3	---
	6-35	<0.06	0.14-0.16	5.6-6.5	<2	High	High	Moderate	0.28		
	35	---	---	---	---	---	---	---	---		
Stout part	0-3	2.0-6.0	0.05-0.10	5.6-6.0	<2	Low	Moderate	Moderate	0.32	1	---
	3-16	6.0-20	0.04-0.09	5.6-6.0	<2	Low	Moderate	Moderate	0.37		
	16	---	---	---	---	---	---	---	---		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Vamer part	0–4	0.6–2.0	0.10–0.16	6.6–7.3	<2	Low	Moderate	Low	0.28	1	------
	4–16	0.06–0.2	0.11–0.18	6.6–7.3	<2	High	High	Low	0.32		
	16	------	------	------	------	------	------	------	------		
Deacon:											
[1] DP: Deacon part	0–16	0.6–2.0	0.18–0.21	6.6–7.8	<2	Low	High	Low	0.24	5	5
	16–44	0.2–0.6	0.15–0.18	7.4–8.4	<2	Moderate	High	Low	0.28		
	44–60	0.2–0.6	0.15–0.18	7.9–9.0	<2	Moderate	High	Low	0.28		
[1] DP: Ayon part	0–6	0.6–2.0	0.14–0.16	7.4–8.4	<2	Low	High	Low	0.24	5	8
	6–60	0.6–2.0	0.10–0.15	7.4–8.4	<2	Low	High	Low	0.24		
[1] DR: Deacon part	0–10	0.6–2.0	0.18–0.21	6.6–7.8	<2	Low	High	Low	0.24	5	5
	10–60	0.2–0.6	0.15–0.18	7.4–8.4	<2	Moderate	High	Low	0.28		
La Brier part	0–7	0.2–2.0	0.13–0.19	7.4–7.8	<2	Moderate	Moderate	Low	0.32	5	6
	7–35	<0.06	0.13–0.17	7.4–8.4	<2	High	High	Low	0.32		
	35–60	0.06–0.2	0.15–0.19	7.9–8.4	<2	Moderate	High	Low	0.37		
Manzano part	0–8	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Moderate	Low	0.28	5	6
	8–68	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.32		
[1] DsE: Deacon part	0–10	0.6–2.0	0.18–0.21	6.6–7.8	<2	Low	High	Low	0.24	5	5
	10–60	0.2–0.6	0.15–0.18	7.4–8.4	<2	Moderate	High	Low	0.28		
Oro Grande part	0–7	0.6–2.0	0.05–0.12	6.6–7.8	<2	Low	Moderate	Low	0.28	1	8
	7	------	------	------	------	------	------	------	------		
Laporte part	0–15	0.6–2.0	0.08–0.15	7.9–8.4	<2	Low	High	Low	0.10	1	8
	15	------	------	------	------	------	------	------	------		
Des Moines:											
[1] DT	0–8	0.06–2.0	0.06–0.14	6.6–7.3	<2	Moderate	Moderate	Low	0.20	3	------
	8–12	0.06–0.6	0.06–0.14	6.6–7.3	<2	Low	Moderate	Low	0.17		
	12–60	0.06–0.2	0.03–0.10	6.6–7.8	<2	Low	High	Low	0.10		
Dioxice:											
DxC, DxC2	0–8	0.6–6.0	0.13–0.18	7.4–8.4	<2	Low	High	Low	0.32	3	3
	8–34	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.37		
	34–60	0.2–2.0	0.08–0.16	7.9–8.4	<2	Moderate	High	Low	0.37		
Etoe:											
[1] EE: Etoe part	0–11	0.6–2.0	0.16–0.18	6.1–6.5	<2	Low	Moderate	Low	0.15	5	------
	11–36	0.6–2.0	0.12–0.14	6.1–6.5	<2	Low	Moderate	Low	0.20		
	36–73	0.6–2.0	0.05–0.11	6.1–7.3	<2	Low	Moderate	Low	0.15		
Etown part	0–4	0.6–2.0	0.07–0.13	6.1–6.5	<2	Low	Moderate	Low	0.10	5	------
	4–18	0.6–2.0	0.03–0.10	6.1–6.5	<2	Low	Moderate	Low	0.10		
	18–30	0.2–0.6	0.02–0.10	6.1–6.5	<2	Moderate	Moderate	Low	0.17		
	30–60	0.2–0.6	0.02–0.08	6.1–6.5	<2	High	High	Low	0.17		
Frolic:											
[1] FC: Frolic part	0–15	0.6–2.0	0.15–0.17	7.4–7.8	<2	Low	High	Low	0.24	5	------
	15–35	0.6–2.0	0.14–0.17	7.4–7.8	<2	Moderate	High	Low	0.24		
	35–42	2.0–6.0	0.13–0.15	6.6–7.3	<2	Low	High	Low	0.37		
	42–60	0.6–2.0	0.15–0.17	6.6–7.3	<2	Low	High	Low	0.64		
Cumulic Haplaquolls part	0–60	------	------	------	------	------	------	------	------	------	------

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Fuera:											
[3] FD:											
Fuera part	0–18	0.6–2.0	0.10–0.14	6.1–7.3	<2	Low	Moderate	Low	0.28	5	------
	18–30	0.06–0.2	0.10–0.15	6.1–7.3	<2	High	High	Low	0.28		
	30–43	0.06–0.2	0.08–0.12	6.1–7.3	<2	High	High	Low	0.28		
	43–60	0.06–0.2	0.07–0.11	6.6–7.8	<2	Moderate	High	Low	0.24		
Burnac part	0–12	0.6–2.0	0.16–0.18	6.1–6.5	<2	Moderate	Moderate	Low	0.28	3	------
	12–34	<0.06	0.14–0.16	6.1–7.3	<2	High	High	Low	0.32		
	34–42	0.06–0.2	0.12–0.14	6.6–7.8	<2	High	High	Low	0.32		
	42	------	------	------	------	------	------	------	------		
[3] FE:											
Fuera part	0–15	0.6–2.0	0.10–0.14	6.1–7.3	<2	Low	Moderate	Low	0.28	5	------
	15–31	0.06–0.2	0.10–0.15	6.1–7.3	<2	High	High	Low	0.28		
	31–58	0.06–0.2	0.08–0.12	6.1–7.3	<2	High	High	Low	0.28		
	58–64	0.06–0.2	0.07–0.11	6.6–7.8	<2	Moderate	High	Low	0.24		
Dargol part	0–6	0.6–2.0	0.13–0.15	5.6–6.5	<2	Low	Moderate	Moderate	0.24	3	------
	6–30	<0.06	0.14–0.16	5.6–6.5	<2	High	High	Moderate	0.28		
	30	------	------	------	------	------	------	------	------		
Vamer part	0–4	0.6–2.0	0.10–0.16	6.6–7.3	<2	Low	Moderate	Low	0.28	1	------
	4–16	0.06–0.2	0.11–0.18	6.6–7.3	<2	High	High	Low	0.32		
	16	------	------	------	------	------	------	------	------		
Gruver:											
GaB	0–5	2.0–6.0	0.11–0.15	6.1–7.3	<2	Low	Moderate	Low	0.24	5	3
	5–34	0.2–0.6	0.15–0.20	7.4–8.4	<2	Moderate	High	Low	0.32		
	34–66	0.2–0.6	0.10–0.16	7.9–8.4	<2	Moderate	High	Low	0.32		
GbB, GcB2	0–9	0.6–2.0	0.15–0.20	6.1–7.8	<2	Moderate	Moderate	Low	0.32	5	6
	9–35	0.2–0.6	0.15–0.20	7.4–8.4	<2	Moderate	High	Low	0.32		
	35–68	0.2–0.6	0.10–0.16	7.9–8.4	<2	Moderate	High	Low	0.32		
Hillery:											
HrD	0–18	0.6–2.0	0.13–0.18	5.6–7.3	<2	Low	Moderate	Moderate	0.28	4	8
	18–60	<0.06	0.11–0.16	5.6–7.3	<2	High	High	Moderate	0.24		
La Brier:											
Lb	0–10	0.2–2.0	0.13–0.19	7.4–7.8	<2	Moderate	Moderate	Low	0.32	5	6
	10–29	<0.06	0.13–0.17	7.4–8.4	<2	High	High	Low	0.32		
	29–62	0.06–0.2	0.15–0.19	7.9–8.4	<2	Moderate	High	Low	0.37		
Lc	0–4	0.06–0.2	0.14–0.16	7.9–8.4	4–8	Moderate	High	Low	0.32	5	7
	4–35	<0.06	0.09–0.11	7.9–8.4	8–16	High	High	Low	0.32		
	35–60	0.06–0.2	0.08–0.10	7.9–8.4	>16	Moderate	High	Low	0.37		
[3] Lr:											
La Brier part	0–10	0.2–2.0	0.13–0.19	7.4–7.8	<2	Moderate	Moderate	Low	0.32	5	6
	10–35	<0.06	0.13–0.17	7.4–8.4	<2	High	High	Low	0.32		
	35–60	0.06–0.2	0.15–0.19	7.9–8.4	<2	Moderate	High	Low	0.37		
Rock outcrop part.											
Laporte:											
LSF	0–10	0.6–2.0	0.08–0.15	7.9–8.4	<2	Low	High	Low	0.10	1	8
	10	------	------	------	------	------	------	------	------		
Litle:											
LtB	0–4	0.6–0.2	0.15–0.21	7.4–8.4	<2	Moderate	High	Low	0.37	3	4L
	4–23	<0.2	0.12–0.16	7.9–8.4	2–8	High	High	Moderate	0.32		
	23	------	------	------	------	------	------	------	------		
Manzano:											
Ma	0–20	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Moderate	Low	0.28	5	6
	20–60	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.32		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
[1] MB:											
Manzano part	0–6	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Moderate	Low	0.28	5	6
	6–60	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.32		
Manzano part	0–27	0.6–2.0	0.13–0.15	6.6–7.8	<2	Low	Moderate	Low	0.24	5	3
	27–64	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.32		
Midnight:											
[1] Mn:											
Midnight part	0–12	0.6–2.0	0.13–0.15	6.6–7.8	<2	Moderate	Moderate	Low	0.28	1	8
	12										
[1] Mn:											
Rombo part	0–20	0.2–0.6	0.14–0.16	6.6–7.8	<2	Moderate	Moderate	Low	0.24	3	8
	20–30	0.06–0.2	0.09–0.11	6.6–7.8	<2	High	High	Low	0.24		
	30										
Rock outcrop part.											
Mion:											
MoB	0–4	0.6–2.0	0.19–0.21	7.4–8.4	<2	Moderate	Moderate	Low	0.37	1	5
	4–16	<0.06	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		
	16										
[1] Mp:											
Mion part	0–4	0.6–2.0	0.19–0.21	7.4–8.4	<2	Moderate	Moderate	Low	0.37	1	5
	4–17	<0.06	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		
	17										
Rock outcrop part.											
[1] MR:											
Mion part	0–4	0.6–2.0	0.19–0.21	7.4–8.4	<2	Moderate	Moderate	Low	0.37	1	5
	4–14	<0.06	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		
	14										
Litle part	0–10	0.2–0.6	0.18–0.21	7.4–8.4	<2	Moderate	High	Low	0.43	3	4L
	10–29	0.06–0.2	0.12–0.16	7.9–8.4	2–8	High	High	Moderate	0.32		
	29										
Moreno:											
[1] MS:											
Moreno part	0–8	0.6–2.0	0.14–0.17	6.6–7.3	<2	Moderate	Moderate	Low	0.24	5	6
	8–37	0.2–0.6	0.16–0.20	6.6–7.3	<2	Moderate	Moderate	Low	0.28		
	37–60	0.06–0.2	0.10–0.14	6.6–7.3	<2	High	High	Low	0.15		
Cypher part	0–2	0.6–2.0	0.06–0.13	6.1–6.5	<2	Low	Moderate	Moderate	0.20	1	7
	2–14	2.0–6.0	0.05–0.10	5.6–6.0	<2	Low	Moderate	Moderate	0.32		
	14										
Morval:											
[1] MT:											
Morval part	0–21	0.6–2.0	0.18–0.21	6.6–7.8	<2	Moderate	Moderate	Low	0.37	5	6
	21–57	0.6–2.0	0.14–0.21	7.4–8.4	<2	Moderate	High	Low	0.43		
	57–60	0.6–2.0	0.06–0.10	7.4–8.4	<2	Moderate	High	Low	0.24		
Moreno part	0–8	0.6–2.0	0.14–0.17	6.6–7.3	<2	Moderate	Moderate	Low	0.24	5	6
	8–37	0.2–0.6	0.16–0.20	6.6–7.3	<2	Moderate	Moderate	Low	0.28		
	37–60	0.06–0.2	0.10–0.14	6.6–7.3	<2	High	High	Low	0.15		
Mughouse:											
[1] Mu:											
Mughouse part	0–4	0.6–2.0	0.11–0.15	7.4–8.4	<2	Moderate	Moderate	Low	0.15	2	8
	4–38	0.06–0.2	0.08–0.14	7.4–8.4	<2	Moderate	High	Low	0.15		
	38										

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Swastika part	0–4 4–11 11–64	0.2–0.6 0.2–0.6 0.06–0.2	0.19–0.21 0.19–0.21 0.15–0.17	6.6–7.3 6.6–7.3 7.4–8.4	<2 <2 <2	Moderate Moderate High	Moderate Moderate High	Low Low Low	0.37 0.37 0.32	5	6
Oro Grande:											
[1] OG: Oro Grande part	0–12 12	0.6–2.0	0.05–0.12	6.6–7.8	<2	Low	Moderate	Low	0.28	1	8
Meloche part	0–9 9–56 56	0.2–0.6 <0.06	0.15–0.21 0.12–0.16	7.4–8.4 7.4–8.4	<2 <2	Moderate High	Moderate High	Low Low	0.24 0.37	4	8
[1] OT: Oro Grande part	0–11 11	0.6–2.0	0.05–0.12	6.6–7.8	<2	Low	Moderate	Low	0.28	1	8
Tafoya part	0–14 14–39 39–46 46	0.6–2.0 0.06–0.2 0.2–0.6	0.08–0.17 0.02–0.07 0.07–0.12	6.6–7.8 6.6–7.8 6.6–7.8	<2 <2 <2	Low Moderate Moderate	Moderate High High	Low Low Low	0.28 0.17 0.24	3	8
Penrose: PE	0–11 11	0.6–2.0	0.15–0.18	7.9–8.4	<2	Low	High	Low	0.15	1	4L
Plack: PL	0–10 10	0.6–2.0	0.10–0.14	7.9–8.4	<2	Low	Moderate	Low	0.24	1	3
Ponil:											
[1] PV: Ponil part	0–4 4–60	0.6–2.0 <0.06	0.11–0.16 0.11–0.16	6.6–7.8 6.1–8.4	<2 <2	Moderate High	Moderate High	Low Low	0.32 0.24	5	------
Vamer part	0–3 3–13 13	0.6–2.0 0.06–0.2	0.10–0.16 0.11–0.18	6.6–7.3 6.6–7.3	<2 <2	Low High	Moderate High	Low Low	0.28 0.32	1	------
Raton:											
[1] Ra: Raton part	0–9 9–15 15	0.2–0.6 0.06–0.2	0.10–0.12 0.08–0.09	6.6–7.3 6.6–7.3	<2 <2	Low High	Moderate High	Low Low	0.28 0.20	1	8
Barela part	0–4 4–12 12–31 31–41 41	0.2–0.6 0.2–0.6 0.06–0.2 0.06–0.2	0.19–0.21 0.19–0.21 0.11–0.13 0.07–0.08	6.6–7.3 6.6–7.3 6.6–7.3 7.4–8.4	<2 <2 <2 <2	Moderate Moderate High High	Moderate Moderate High High	Low Low Low Low	0.28 0.37 0.24 0.20	4	5
[1] RD: Raton part	0–8 8–13 13	0.2–0.6 0.06–0.2	0.10–0.12 0.08–0.09	6.6–7.3 6.6–7.3	<2 <2	Low High	Moderate High	Low Low	0.28 0.20	1	8
Dalcan part	0–4 4–34 34	0.6–2.0 0.06–0.2	0.08–0.13 0.05–0.10	6.1–7.8 6.1–7.8	<2 <2	Low Moderate	Moderate High	Moderate Moderate	0.24 0.28	2	8
[1] RE: Raton part	0–9 9–15 15	0.2–0.6 0.06–0.2	0.10–0.12 0.08–0.09	6.6–7.3 6.6–7.3	<2 <2	Low High	Moderate High	Low Low	0.28 0.20	1	8

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Wellsville part	0–6	0.6–2.0	0.11–0.16	6.1–7.3	<2	Low	Moderate	Low	0.17	5	8
	6–32	0.2–0.6	0.15–0.17	6.6–8.4	<2	Moderate	High	Low	0.17		
	32–60	0.6–2.0	0.11–0.15	7.9–8.4	<2	Moderate	High	Low	0.17		
Ring:											
[1] RG:											
Ring part	0–6	0.6–2.0	0.11–0.17	6.1–6.5	<2	Low	Moderate	Low	0.20	5	------
	6–14	0.2–0.6	0.10–0.14	6.1–6.5	<2	Moderate	High	Low	0.20		
	14–39	0.2–0.6	0.05–0.10	6.6–7.3	<2	Moderate	High	Low	0.17		
	39–60	0.6–2.0	0.04–0.09	6.6–7.3	<2	Low	Moderate	Low	0.17		
Brycan part	0–9	0.6–2.0	0.15–0.18	7.4–7.8	<2	Low	High	Low	0.32	5	5
	9–60	0.6–2.0	0.14–0.19	7.4–7.8	<2	Low	High	Low	0.20		
Riverwash:											
RV.											
[1] Rz:											
Riverwash part.											
Manzano part	0–9	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Moderate	Low	0.28	5	6
	9–60	0.2–0.6	0.16–0.21	7.4–8.4	<2	Moderate	High	Low	0.32		
Saladon:											
SaC	0–4	0.2–0.6	0.15–0.17	6.6–7.3	<2	High	High	Low	0.15	5	------
	4–60	<0.06	0.13–0.17	6.6–7.3	<2	High	High	Low	0.15		
Seelez:											
SeB, SfC, SnA	0–36	6.0–20	0.11–0.13	7.4–8.4	<2	Low	High	Low	0.20	5	3
	36–60	6.0–20	0.06–0.08	7.4–8.4	<2	Low	High	Low	0.20		
Swastika:											
SoA, SpD, SsB	0–6	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37	5	6
	6–33	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37		
	33–60	0.06–0.2	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		
St	0–3	0.2–0.6	0.14–0.16	6.6–7.3	4–8	Moderate	High	Low	0.37	5	6
	3–8	0.2–0.6	0.14–0.16	6.6–7.3	4–8	Moderate	High	Low	0.37		
	8–42	0.06–0.2	0.08–0.10	7.4–8.4	8–16	High	High	Low	0.32		
	42–60	0.2–0.6	0.09–0.11	7.4–8.4	8–16	Moderate	High	Low	0.43		
[1] SW	0–4	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37	5	6
	4–11	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37		
	11–30	0.06–0.2	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		
	30–64	0.2–0.6	0.19–0.21	7.4–8.4	<2	Moderate	High	Low	0.43		
[1] SX:											
Swastika part	0–2	0.2–0.6	0.14–0.16	6.6–7.3	4–8	Moderate	High	Low	0.37	5	6
	2–29	0.2–0.6	0.14–0.16	6.6–7.3	4–8	Moderate	High	Low	0.37		
	29–60	0.06–0.2	0.08–0.10	7.4–8.4	8–16	High	High	Low	0.32		
La Brier part	0–3	0.06–0.2	0.14–0.16	7.9–8.4	4–8	Moderate	High	Low	0.32	5	7
	3–60	<0.06	0.09–0.11	7.9–8.4	8–16	High	High	Low	0.32		
Texline:											
TED	0–5	2.0–6.0	0.11–0.15	7.9–8.4	<2	Low	Moderate	Low	0.24	5	3
	5–42	0.6–2.0	0.12–0.18	7.9–8.4	<2	Moderate	High	Low	0.32		
	42–66	0.6–2.0	0.12–0.18	7.9–8.4	<2	Moderate	High	Low	0.32		
Thunderbird:											
[1] TH:											
Thunderbird part	0–4	0.2–0.6	0.09–0.11	6.6–7.8	<2	Moderate	Moderate	Low	0.32	2	------
	4–24	0.06–0.2	0.09–0.14	6.6–7.8	<2	High	High	Low	0.37		
	24	------	------	------	------	------	------	------	------		
Torreon part	0–4	0.6–2.0	0.16–0.21	6.6–7.3	<2	Low	Moderate	Low	0.28	5	6
	4–11	0.2–0.6	0.19–0.21	6.6–7.8	<2	Moderate	Moderate	Low	0.24		
	11–60	0.06–0.2	0.14–0.18	6.6–7.8	<2	High	High	Low	0.24		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Tinaja: TNE	0–6	0.6–2.0	0.10–0.14	7.4–7.8	<2	Low	Moderate	Low	0.10	5	7
	6–41	0.6–2.0	0.04–0.10	7.4–8.4	<2	Low	High	Low	0.10		
	41–60	6.0–20	0.01–0.04	7.4–8.4	<2	Low	High	Low	0.10		
Torreon: [1]TO: Torreon part	0–4	0.6–2.0	0.16–0.21	6.6–7.3	<2	Low	Moderate	Low	0.28	5	6
	4–9	0.2–0.6	0.19–0.21	6.6–7.8	<2	Moderate	Moderate	Low	0.24		
	9–62	0.06–0.2	0.14–0.18	6.6–7.8	<2	High	High	Low	0.24		
Deacon part	0–3	0.6–2.0	0.18–0.21	6.6–7.8	<2	Low	Moderate	Low	0.24	5	5
	3–22	0.2–0.6	0.15–0.18	7.4–8.4	<2	Moderate	High	Low	0.28		
	22–60	0.2–0.6	0.15–0.18	7.9–9.0	<2	Low	High	Low	0.28		
Travessilla: [1]Tr: Travessilla part	0–9	2.0–6.0	0.06–0.12	7.4–8.4	<2	Low	Moderate	Low	0.37	1	------
	9										
Rock outcrop part.											
[1]TS: Travessilla part	0–11	2.0–6.0	0.06–0.12	7.4–8.4	<2	Low	Moderate	Low	0.37	1	------
	11										
Bernal part	0–18	0.6–2.0	0.13–0.16	6.6–7.8	<2	Moderate	High	Low	0.28	1	5
	18										
Rock outcrop part.											
Tricon: [1]TX: Tricon part	0–4	0.2–2.0	0.19–0.21	6.6–7.8	<2	Low	Moderate	Low	0.32	2	6
	4–23	0.06–0.2	0.14–0.21	6.6–8.4	<2	High	High	Low	0.28		
	23										
Plack part	0–9	0.6–2.0	0.10–0.18	7.9–8.4	<2	Low	Moderate	Low	0.32	1	5
	9										
Ustochrepts: [1]US: Ustochrepts part	0–10	0.6–2.0	0.10–0.14	6.1–7.3	<2	Low	Low	Low	0.24	3	------
	10–30	0.6–2.0	0.06–0.08	6.1–7.3	<2	Low	Moderate	Low	0.15		
	30										
Rock outcrop part.											
Vermejo: Ve, Vm	0–2	0.2–0.6	0.19–0.21	7.9–9.0	>2	Moderate	High	High	0.28	5	4L
	2–60	<0.06	0.15–0.17	7.9–9.0	>2	High	High	High	0.32		
[1]Vs2: Vermejo part	0–2	0.2–0.6	0.19–0.21	7.9–9.0	>2	Moderate	High	High	0.28	5	4L
	2–60	<0.06	0.15–0.17	7.9–9.0	>2	High	High	High	0.32		
Swastika part	0–2	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37	5	6
	2–26	0.2–0.6	0.19–0.21	6.6–7.3	<2	Moderate	Moderate	Low	0.37		
	26–60	0.06–0.2	0.15–0.17	7.4–8.4	<2	High	High	Low	0.32		

TABLE 11.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Wellsville:											
WEG	0–10	0.6–2.0	0.11–0.16	6.1–7.3	<2	Low	Moderate	Low	0.17	5	8
	10–32	0.2–0.6	0.15–0.18	7.4–8.4	<2	Moderate	High	Low	0.20		
	32–63	0.6–2.0	0.11–0.15	7.9–8.4	<2	Moderate	High	Low	0.17		

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 11, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Erosion factors, as used in table 11, pertains to the soil erodibility and soil loss tolerance factors used in the Universal Soil Loss Equation. (*13*).

The soil erodibility factor (K) used in the Universal Soil Loss Equation is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. It is a value determined experimentally for selected benchmark soils. Based on a knowledge of the behavior of soil properties and their interactions, these data are synthesized and values assigned to other kinds of soil. K values that have been obtained experimentally range from .02 to .69. Twelve K value classes are used as follows: .10, .15, .17, .20, .24, .28, .32, .37, .43, .49, .55, and .64. A K value of .10 is the most erosion resistant. A K value of .64 is the most easily eroded.

Soil loss tolerance factor (T), sometimes called permissible soil loss, is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely. Soil loss tolerance values (T) of 1 through 5 are used. The numbers represent the permissible tons of soil loss per acre per year where food, feed, and fiber plants are to be grown. "T" values are not applicable to construction sites or to other nonfarm uses of the erosion equation.

Wind erodibility groups (WEG) is a group of soils having the same potential for soil blowing. The wind erodibility group establishes a range of "I" values used in the wind erosion equation to predict the amount of soil loss (in tons per acre per year) that results from wind action. The "I" value (or soil erodibility index) is the soils' contribution to wind erosion. It is the average annual soil loss that would occur from an isolated, smooth, unsheltered, wide and bare field at Garden City, Kansas. The properties that affect soil blowing are those that affect the stability of the aggregates against breakdown by tillage and abrasion from wind. These properties are texture, organic matter, calcium carbonate content, mineralogy, and perhaps others such as freezing and thawing, or wetting and drying. The groups range from 1 (the greatest soil blowing hazard) to 8 (the most resistant to wind erosion).

Soil and water features

Features that relate to runoff or infiltration of water, to flooding, to grading and excavation, and to subsidence and frost action of each soil are indicated in table 12. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table, by the presence of bedrock or a cemented pan in the upper 5 or 6 feet of the soil, by subsidence, or by frost action.

Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence the minimum rate of infiltration into the bare soil after prolonged wetting are depth to a water table, water intake rate and permeability after prolonged wetting, and depth to layers of slowly or very slowly permeable soil.

TABLE 12.—*Soil and water features*

[Absence of an entry indicates the feature is not a concern. The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table		Bedrock		Cemented pan		Potential frost action
		Frequency	Duration	Months	Depth	Months	Depth	Hardness	Depth	Hardness	
					Ft		*In*		*In*		
Abreu:											
[1] AB:											
Abreu part	C	None			>6.0		40–60	Hard			Moderate.
Cypher part	D	None			>6.0		10–20	Hard			Moderate.
Angostura:											
[1] AG:	B	None			>6.0		>60				Moderate.
[1] AN:											
Angostura part	B	None			>6.0		>60				Moderate.
Tolby part	B	None			>6.0		>60				Low.
Apache:											
[1] ApD:											
Apache part	D	None			>6.0		6–20	Hard			Moderate.
Ayon part	B	None			>6.0		>60				Moderate.
Aridic Argiustolls:											
[1] ARF, [1] ARG:											
Aridic Argiustolls part		None			>6.0						
Rock outcrop part											
Bandera:											
[1] BA:											
Bandera part	B	None			>6.0		>60				Moderate.
Cinder land part											
Barela:											
[1] BE:											
Barela part	C	None			>6.0		40–60	Hard			Moderate.
Yankee part	C	None			>6.0		>60				Moderate.
Berthoud:											
BhD	B	None			>6.0		>60				Moderate.
Brycan:											
[1] BR	B	None			>6.0		>60				Moderate.
Bundo:											
[1] BU	B	None			>6.0		>60				Moderate.
Burnac:											
[1] BY:											
Burnac part	D	None			>6.0		40–60	Hard			Moderate.
Hillery part	D	None			>6.0		>40	Hard			Moderate.
Capulin:											
[1] CaD:											
Capulin part	B	None			>6.0		>60				Moderate.
Ayon part	B	None			>6.0		>60				Moderate.

TABLE 12.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action
					Ft		*In*		*In*		
[1] CB:											
Capulin part	B	None			>6.0		>60				Moderate.
Torreon part	C	None			>6.0		>60				Low.
Carnero:											
[1] CP:											
Carnero part	C	None			>6.0		20–40	Hard			Low.
Partri part	C	None			>6.0		>60				Low.
Dioxice part	B	None			>6.0		>60				Moderate.
Colmor:											
CrB, CrC, CsB, CsC	B	None			>6.0		>60				Moderate.
[1] CT:											
Colmor part	B	None			>6.0		>60				Moderate.
Colmor part	B	None			>6.0		>60				Moderate.
[1] CV:											
Colmor part	B	None			>6.0		>60				Moderate.
Vermejo part	D	Rare			>6.0		>60				Low.
Litle part	C	None			>6.0		20–40	Rippable			Low.
Cypher:											
[1] CY:											
Cypher part	D	None			>6.0		10–20	Hard			Moderate.
Bundo part	B	None			>6.0		>60				Moderate.
Dalhart:											
DaB, DaC	B	None			>6.0		>60				Moderate.
[1] DB:											
Dalhart part	B	None			>6.0		>60				Moderate.
Seelez part	B	None			>6.0		>60				Moderate.
Dallam:											
DmB, DmC2, DnB, DnB2	B	None			>6.0		>60				Moderate.
Dargol:											
[1] DO:											
Dargol part	D	None			>6.0		20–40	Hard			Moderate.
Stout part	D	None			>6.0		6–20	Hard			Moderate.
Vamer part	D	None			>6.0		7–20	Hard			Moderate.
Deacon:											
[1] DP:											
Deacon part	B	None			>6.0		>60				Moderate.
Ayon part	B	None			>6.0		>60				Moderate.
[1] DR:											
Deacon part	B	None			>6.0		>60				Moderate.
La Brier part	C	Rare			>6.0		>60				Low.
Manzano part	C	Rare			>6.0		>60				Moderate.

TABLE 12.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action
					Ft		*In*		*In*		
[1] DsE: Deacon part	B	None			>6.0		>60				Moderate.
Oro Grande part	D	None			>6.0		7–20	Hard			Moderate.
[1] DsE: Laporte part	D	None			>6.0		10–20	Rippable			Moderate.
Des Moines: [1] DT	C	None			>6.0		>40	Hard			Moderate.
Dioxice: DxC, DxC2	B	None			>6.0		>60				Moderate.
Etoe: [1] EE: Etoe part	B	None			>6.0		>60				Moderate.
Etown part	B	None			>6.0		>60				Moderate.
Frolic: [1] FC: Frolic part	B	Common	Long	May–Sep	3.0–5.0	May–Sep	>60				Moderate.
Cumulic Haplaquolls part	D	Frequent	Very long	May–Sep	0.–3.0	Jan–Dec	>60				Moderate.
Fuera: [1] FD: Fuera part	C	None			>6.0		>60				Low.
Burnac part	D	None			>6.0		40–60	Hard			Moderate.
[1] FE: Fuera part	C	None			>6.0		>60				Low.
Dargol part	D	None			>6.0		20–40	Hard			Moderate.
Vamer part	D	None			>6.0		7–20	Hard			Moderate.
Gruver: GaB, GbB, GcB2	C	None			>6.0		>60				Low.
Hillery: HrD	D	None			>6.0		>40	Hard			Moderate.
La Brier: Lb	C	None			>6.0		>60				Low.
Lc	C	Rare			5.0–6.0	May–Sep	>60				Low.
[1] Lr: La Brier part	C	Rare			>6.0		>60				Low.
Rock outcrop part											
Laporte: LSF	D	None			>6.0		10–20	Rippable			Moderate.
Litle: LtB	C	None			>6.0		20–40	Rippable			Low.

TABLE 12.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action
					Ft		*In*		*In*		
Manzano:											
Ma	C	Rare			>6.0		>60				Moderate.
[1] MB:											
Manzano part	C	Rare			>6.0		>60				Moderate.
Manzano part	C	Rare			>6.0		>60				Moderate.
Midnight:											
[1] Mn:											
Midnight part	D	None			>6.0		5–16	Rippable			Moderate.
Rombo part	C	None			>6.0		22–40	Rippable			Low.
Rock outcrop part											
Mion:											
MoB	D	None			>6.0		10–20	Rippable			Low.
[1] Mp:											
Mion part	D	None			>6.0		10–20	Rippable			Low.
Rock outcrop part											
[1] MR:											
Mion part	D	None			>6.0		10–20	Rippable			Low.
Litle part	C	None			>6.0		20–40	Rippable			Low.
Moreno:											
[1] MS:											
Moreno part	C	None			>6.0		>60				Moderate.
Cypher part	D	None			>6.0		10–20	Hard			Moderate.
Morval:											
[1] MT:											
Morval part	B	None			>6.0		>60				Moderate.
Moreno part	C	None			>6.0		>60				Moderate.
Mughouse:											
[1] Mu:											
Mughouse part	C	None			>6.0		20–40	Hard			Low.
Swastika part	C	None			>6.0		>60				Low.
Oro Grande:											
[1] OG:											
Oro Grande part	D	None			>6.0		7–20	Hard			Moderate.
Meloche part	D	None			>6.0		40–60	Rippable			Low.
[1] OT:											
Oro Grande part	D	None			>6.0		7–20	Hard			Moderate.
Tafoya part	C	None			>6.0		40–60	Hard			Low.

TABLE 12.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action
					Ft		*In*		*In*		
Penrose: PE	D	None			>6.0		10–20	Rippable			Low.
Plack: PL	D	None			>6.0		>60		6–20	Rippable	Moderate.
Ponil: [1] PV: Ponil part	D	None			>6.0		40–60	Rippable			Moderate.
[1] PV: Vamer part	D	None			>6.0		7–20	Hard			Moderate.
Raton: [1] Ra: Raton part	D	None			>6.0		6–20	Hard			Moderate.
Barela part	C	None			>6.0		40–60	Hard			Moderate.
[1] RD: Raton part	D	None			>6.0		6–20	Hard			Moderate.
Dalcan part	C	None			>6.0		21–40	Hard			Moderate.
[1] RE: Raton part	D	None			>6.0		6–20	Hard			Moderate.
Wellsville part	B	None			>6.0		>60				Moderate.
Ring: [1] RG: Ring part	C	None			>6.0		>60				Moderate.
Brycan part	B	None			>6.0		>60				Moderate.
Riverwash: RV		Frequent	Long	May–Oct							
[1] Rz: Riverwash part		Frequent	Long	May–Oct							
Manzano part	C	Common	Brief	May–Oct	>6.0		>60				Moderate.
Saladon: SaC	D	Common	Long	Jun–Sep	0–4.0	Jun–Sep	>60				Moderate.
Seelez: SeB, SfC, SnA	B	None			>6.0		>60				Moderate.
Swastika: SoA, SpD, SsB	C	None			>6.0		>60				Low.
St	C	None			5.0–6.0	May–Sep	>60				Low.
[1] SW	C	None			>6.0		>60				Low.
[1] SX: Swastika part	C	None			5.0–6.0	May–Sep	>60				Low.
La Brier part	C	Rare			5.0–6.0	May–Sep	>60				Low.
Texline: TED	B	None			>6.0		>60				Moderate.

TABLE 12.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		Bedrock		Cemented pan		Potential frost action
		Frequency	Duration	Months	Depth	Months	Depth	Hardness	Depth	Hardness	
					Ft		*In*		*In*		
Thunderbird:											
[1] TH:											
Thunderbird part	D	None			>6.0		20–40	Hard			Moderate.
Torreon part	C	None			>6.0		>60				Low.
Tinaja:											
TNE	B	None			>6.0		>60				Low.
Torreon:											
[1] TO:											
Torreon part	C	None			>6.0		>60				Low.
Deacon part	B	None			>6.0		>60				Moderate.
Travessilla:											
[1] Tr:											
Travessilla part	D	None			>6.0		6–20	Hard			Low.
Rock outcrop part	---	---	---	---	---	---	---	---	---	---	---
[1] TS:											
Travessilla part	D	None			>6.0		6–20	Hard			Low.
Bernal part	D	None			>6.0		8–20	Hard			Moderate.
Rock outcrop part	---	---	---	---	---	---	---	---	---	---	---
Tricon:											
[1] TX:											
Tricon part	C	None			>6.0		>60		20–40	Hard	Low.
Plack part	D	None			>6.0		>60		4–20	Rippable	Moderate.
Ustochrepts:											
[1] US:											
Ustochrepts part	B/D	None			>6.0		10–60	Hard			Moderate.
Rock outcrop part	---	---	---	---	---	---	---	---	---	---	---
Vermejo:											
Ve, Vm	D	Rare			>6.0		>60				Low.
[1] Vs2:											
Vermejo part	D	Rare			>6.0		>60				Low.
Swastika part	C	None			>6.0		>60				Low.
Wellsville:											
WEG	B	None			>6.0		>60				Moderate.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

Flooding is rated in general terms that describe the frequency, duration, and period of the year when flooding is most likely. The ratings are based on evidences in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding; local information about floodwater heights and the extent of flooding; and local knowledge that relates the unique landscape position of each soil to historic floods. Most soils in low positions on the landscape where flooding is likely to occur are classified as Fluvents at the suborder level or as Fluventic subgroups. See the section "Classification of the Soils."

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

A seasonal high water table is the highest level of a saturated zone more than 6 inches thick in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed during the course of the soil survey. Indicated are the depth to the seasonal high water table and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not to construct basements and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at depths of 5 to 6 feet or less. For many soils, limited ranges in depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and other observations during the soil mapping. The kind of bedrock and its relative hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers that are strongly compacted (indurated). Such pans cause difficulty in excavation. Hardness of pans is defined the same as hardness of bedrock.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action is defined as freezing temperatures in the soil and movement of soil moisture into the freezing zone, which causes the formation of ice lenses. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Engineering test data

Table 13 contains engineering test data for some of the major soil series in Colfax County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material, as has been explained for table 10.

Formation and Classification of the Soils

This section describes the major factors of soil formation in Colfax County. It briefly explains the system of classifying and naming soils in categories broader than the soil series.

The term "soil," as used in this publication, is defined as the unconsolidated mineral material on the earth's surface that supports plant growth (*15*). An individual soil is a three-dimensional body that occupies a very small or a very large space. The shape of an individual soil body also varies and may or may not be predictable. The size and shape of individual soil bodies often are related to the shape and nature of landforms. Soils of the Tinaja series, for example, are on river terrace remnants, while soils of the Mion series are on erosional remnants of shale deposits.

Factors of Soil Formation

Soil is a naturally occurring body. The characteristics of a particular soil at a particular position on the landscape result from the interaction of five major soil forming factors. An individual soil has reached its present state of horizon differentiation through (1) plants and animals and (2) climate acting on (3) the parent material as conditioned by (4) relief and (5) the length of time factors of soil formation have been operating. Each of these factors influences soil formation, and the effect of any one factor is modified by the other four.

The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effect of any one. Many soils show, however, that they have been more strongly influenced by one or more of the factors than by the others. The shale parent material, for example, has been a dominant influence in the Mion, Litle, and Vermejo soils. In such soils as Tolby and Bundo, climate and relief have been dominant. Plant life has influenced the Brycan, Hillery, La Brier, and Manzano soils.

TABLE 13.—*Engineering*

[Tests performed by the New Mexico State Highway Department in accordance with standard

Soil name and location	Report No.	Depth (in.)	Est. pct. >3 in.	Percentage passing sieve [1]		
				2 in.	1 in.	¾ in.
Ayon stony silt loam from an area of Apache-Ayon complex, 1 to 9 percent slopes: 740 ft. S, 1,100 ft. E of NW corner of sec. 13, T.26N., R.25E.	17246	0–6	------------	100	98	96
	17247	6–17	60	100	57	53
	17248	17–31	60	100	92	90
Colmor silt loam from an area of Colmor association: about 4 miles W of Springer; 90 ft. E and 1,700 ft. N of SW corner of sec. 30, T.25N., R.22E.	17258	3–10	------------	------------	------------	------------
	17259	17–29	------------	------------	------------	------------
	17260	41–52	------------	------------	------------	------------
Dalhart fine sandy loam from an area of Dalhart-Seelez association, gently sloping: about 2 miles E of Maxwell; 1,920 ft. E, 2,050 ft N of SW corner of sec. 33, T.27N., R.23E.	17234	0–7	------------	------------	------------	------------
	17235	14–25	------------	------------	------------	------------
	17236	25–48	------------	------------	------------	------------
Dallam fine sandy loam, 0 to 3 percent slopes: 120 ft. S, 70 ft. E of NW corner of sec. 14, T.24N., R.27E.	17255	0–5	------------	------------	------------	------------
	17256	19–37	------------	------------	------------	------------
	17257	37–75	------------	------------	------------	------------
Dargol stony loam from an area of Dargol-Stout-Vamer association, sloping: about 18 miles W of Raton, or 2.4 miles W of Armstrong Lookout along York Canyon Rd, and 70 yards N of road	17241	0–6	------------	100	96	96
	17242	6–15	------------	------------	------------	------------
Etoe loam from an area of Etoe-Etown association, steep: about 12 miles S of Eagle Nest or 1 mile NNW of point where U.S. Highway 64 leaves the Moreno Valley	17239	3–11	------------	------------	------------	------------
	17240	36–52	50	100	65	58
Partri silt loam from an area of Carnero-Partri association: 850 ft. S, 50 ft. W of NE corner of sec. 9, T.26N., R.27E.	17249	0–3	------------	------------	------------	------------
	17250	14–29	------------	------------	------------	------------
	17251	29–43	------------	------------	------------	------------
Seelez fine sandy loam from an area of Dalhart-Seelez association, gently sloping: 1,100 ft. N, 2,975 ft. E of SW corner of sec. 33, T.28N., R.23E.	17252	2–15	------------	------------	------------	------------
	17253	15–36	------------	------------	------------	------------
	17254	36–68	------------	------------	------------	------------
Swastika silt loam from an area of Swastika association, gently sloping: about 20 miles S of Raton; 300 ft. S, 150 ft. E of NW corner of sec. 7, T.28N., R.23E.	17228	0–3	------------	------------	------------	------------
	17229	7–18	------------	------------	------------	------------
	17230	26–64	------------	------------	------------	------------
Tinaja gravelly sandy clay loam, 3 to 25 percent slopes: 1,320 ft. E, 2,100 ft. S of NW corner of sec. 13, T.27N., R.22E.	17243	0–6	------------	100	98	96
	17244	12–25	------------	100	100	95
	17245	41–60	------------	100	95	82
Vermejo silty clay loam: about 5 miles N of Maxwell; 265 ft. W, 250 ft. N of SE corner of sec. 36, T.28N., R.22E.	17231	0–4	------------	------------	------------	------------
	17232	9–20	------------	------------	------------	------------
	17233	20–45	------------	------------	------------	------------

test data

procedures of the American Association of State Highway and Transportation Officials (AASHTO)]

Percentage passing sieve [1]—Cont.					Liquid limit	Plasticity index	Classification	
⅜ in.	No. 4	No. 10	No. 40	No. 200			AASHTO [2]	Unified
92	90	88	85	72	48	14	A–7–5(11)	ML
50	45	40	37	32	41	9	A–2–5(0)	GM
86	84	57	34	18	NP [3]	NP	A–1–b(0)	SM–1
----------	----------	100	97	78	34	9	A–4(7)	ML
----------	----------	100	98	84	35	13	A–6(11)	CL–1
----------	----------	100	98	78	41	14	A–7–6(11)	ML
----------	----------	100	97	30	NP	NP	A–2–4(0)	SM–2
----------	----------	100	97	57	NP	NP	A–4(0)	ML
----------	----------	100	99	68	NP	NP	A–4(0)	ML
----------	----------	100	87	40	NP	NP	A–4(1)	SM–2
----------	----------	100	93	48	27	10	A–4(2)	SC
----------	----------	100	99	48	28	9	A–4(1)	SC
94	90	87	78	57	NP	NP	A–4(0)	ML
----------	----------	100	82	65	52	24	A–7–6(15)	CH
----------	----------	100	94	70	NP	NP	A–4(0)	ML
42	28	19	16	7	NP	NP	A–1–a(1)	GW–GM
----------	----------	100	99	92	NP	NP	A–4(0)	ML
----------	----------	100	99	81	43	16	A–7–6(14)	ML
----------	----------	100	98	79	35	14	A–6(10)	CL–1
----------	----------	100	96	26	NP	NP	A–2–4(0)	SM–2
----------	----------	100	98	20	NP	NP	A–2–4(0)	SM–1
----------	----------	100	98	19	NP	NP	A–2–4(0)	SM–1
----------	----------	100	99	84	NP	NP	A–4(0)	ML
----------	----------	100	99	94	40	16	A–6(17)	CL–2
----------	----------	100	98	85	35	13	A–6(11)	CL–1
92	90	76	65	30	NP	NP	A–2–4(0)	SM–1
82	69	54	36	15	NP	NP	A–1–b(0)	SM–1
62	43	24	10	4	NP	NP	A–1–a(0)	GW
----------	----------	100	98	81	31	10	A–4(7)	CL–1
----------	----------	100	97	88	36	14	A–6(12)	CL–1
----------	----------	100	98	79	36	15	A–6(11)	CL–1

TABLE 13.—*Engineering*

Soil name and location	Report No.	Depth (in.)	Est. pct. >3 in.	Percentage passing sieve [1]		
				2 in.	1 in.	¾ in.
Yankee silt loam from an area of Barela-Yankee association:	17261	0–4	------------	------------	------------	------------
340 ft. W, 5 ft. N of SE corner of sec. 22, T. 31N., R.26E.	17262	14–27	------------	------------	------------	------------
	17263	49–60	------------	------------	------------	------------

[1] Mechanical analyses according to AASHTO Designation T88 (*1*). Results by this procedure frequently differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Services (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters is excluded from calculations of grain-size fractions. The mechanical analyses data used in this table are not suitable for use in naming textural classes for soils.

Parent material

The soils of Colfax County formed in a variety of parent materials (*3, 5, 8*) that are related to five geologic periods.

The Quaternary Period is the youngest geologic period in the county. It is represented by four general types of deposits. The youngest of these is alluvial deposits on flood plains of recent streams. These sediments are loamy to sandy and often contain rock fragments. They range from less than 1 foot thick in some parts of secondary stream channels to more than 50 feet thick in some parts of the Canadian River Valley. Soils of the Seelez and Manzano series are representative of the soils formed in this material.

Colluvial deposits are on upland slopes. These deposits are loamy to clayey and contain rock fragments and boulders. They are 1 foot to over 50 feet thick. Aridic Argiustolls are representative of soil formed in this material.

Alluvial deposits above the level of stream flood plains in valleys, and flats are loamy to clayey. Some deposits contain rock fragments. Soils that formed in these deposits are in the Berthoud, Brycan, Deacon, Moreno, and Morval series.

Basalt flows were emplaced during the Quaternary Period and are now areas on basalt-capped mesas and uplands. Soils that formed on the basalt parent rock belong to the Apache, Ayon, Bandera, Burnac, Dalcan, and Hillery series. Alluvial and eolian deposits are in the lower, smoothly sloping areas. Soils such as Capulin, Torreon, and Thunderbird formed in these materials.

The Tertiary Period, the second oldest geologic period in the survey area, is represented by four general types of geologic materials. The first material is sloping to moderately steep Tertiary basalt flows. Soils of the Barela, Raton, and Yankee series formed in materials weathered from these flows.

The second material is in the level to gently rolling Ogallala Formation of late Tertiary age. It has irregularly bedded sandy, loamy, and clayey deposits containing lime cemented layers. Gravel occurs in some places. Some of the soils that formed in these materials are in the Dallam, Dioxice, Gruver, Plack, and Texline series.

The third material is in the early Tertiary Poison Canyon and Raton Formations. These formations occupy a large part of the northwestern part of the county. They are a highly dissected plateau. The materials are interbedded sandstones, shales, and some coal. Representative soils formed in these materials are in the Dargol, Fuera, Midnight, Ponil, Rombo, Stout, and Vamer series.

Igneous intrusive rock is the fourth material. It occurs in two general areas in the county. These crystalline rocks, with a composition that is intermediate between basalt and granite, formed beneath the earth's surface and were exposed by uplift, erosion, or both. The weathered materials from these rocks are loamy and sandy deposits with a high content of rock fragments. The relief is generally steep mountain slopes. Representative soils formed in these materials are in the Des Moines, Angostura, and Tolby series.

The Cretaceous Period is represented by a variety of sedimentary deposits in Colfax County. Shales of the Pierre, Graneros, and Carlile Formations are in the eastern and central parts of the county. The topography is nearly level to hilly. Soils of the Litle and Mion series formed in these materials. Soils that formed in alluvial-eolian deposits derived from these shales are in the Colmor, Swastika, and Vermejo series.

The Dakota Sandstone Formation is level to steep and is in the southeast part of the county. It consists of thick beds of hard sandstone. Soils of the Bernal, Carnero, Partri, and Travessilla series are representative of those weathered from this formation. Nearly level to steep Greenhorn and Fort Hays Limestone is in small, scattered areas in the county. Soils of the Laporte and Penrose series are representative of those weathered from these limestones.

The Pennsylvanian Period is represented by a group of rocks in the western part of the county. The materials are limestone, sandstone, and shale and are on steep mountain slopes. Soils of the Angostura, Etoe, and Etown series are representative of those weathered from these rocks.

Precambrian rocks in the mountainous areas in the western part of the county are the oldest geological materials in Colfax County. The materials are sand and loam that are high in rock fragments. Soils in the Cypher and Bundo series are examples of soils formed in these materials.

test data—Continued

Percentage passing sieve [1]					Liquid limit	Plasticity index	Classification	
⅜ in.	No. 4	No. 10	No. 40	No. 200			AASHTO [2]	Unified
------------	------------	100	95	85	NP	NP	A–4(0)	ML
------------	------------	100	97	90	46	12	A–7–5(14)	ML
------------	------------	100	99	90	45	13	A–7–5(15)	ML

[2] Based on AASHTO Designation M145–49.

[3] NP = Nonplastic.

The different parent materials can affect soil formation within short distances (fig. 10).

Relief and drainage

The relief of Colfax County is varied and affects soil formation through its influence on drainage, erosion, plant cover, soil temperature, and the microclimate of the soil.

The high, steeply sloping mountains along the western side of the county drop from elevations near 11,000 feet to the moderately sloping Moreno Valley situated at an elevation of about 8,000 feet. The land surface east of the Moreno Valley again rises sharply to elevations over 12,000 feet on Touch-Me-Not, Baldy, and Little Costilla Peaks. These high mountains slope steeply to the east to the Park Plateau. This is a highly dissected plateau with elevations that range from over 9,000 feet at its western edge to near 7,000 feet in the east where the plateau joins the nearly level to undulating plains. The plains slope smoothly toward the Canadian River at an average elevation of 6,000 feet and then rise gradually to elevations near 7,000 feet toward the east side of the county.

High basalt flows above 8,000 feet in the northwestern and southwestern parts of the county have sloping and rolling tops and very steep sides. Lower basalt flows near elevations of 7,000 feet are scattered across the plains and also have smoothly sloping and rolling tops and short steep slopes at the edges.

A geologic deformation in the east-central part of the county left a range of low, moderately steep to steep mountains and many isolated peaks. Some of these peaks are over 8,000 feet. Erosional remnants of shale deposits throughout the plains area give rise to low hills, some of which have short steep slopes.

Relief and surface drainage are closely related. The main surface drainage in the county is the Canadian River. Its source is just north of the Colorado-New Mexico State line near the northwestern corner of the county. The Canadian River flows toward the southeast, turns south near Raton, leaves Colfax County in the vicinity of Taylor Springs, and flows to its junction with the Arkansas River in eastern Oklahoma. The west part of Colfax County is drained by the Vermejo River and Ponil, Cimarron, and Rayado Creeks, which join the Canadian River before leaving the survey area. The eastern part of the county is drained by Chicorica and Una de Gato Creeks and several smaller streams, all flowing in a generally southwest direction to their junctions with the Canadian River. The extreme eastern edge of the county drains to the east and southeast. The waters eventually reach the Arkansas River. There is a small area in the southwest corner of the survey area that is drained by Coyote Creek. This creek flows south to its junction with the Mora River, which flows into the Canadian River.

Relief and drainage modify the effects of climate and vegetation. If other factors are about equal, runoff is rapid on steeply sloping areas and slow on level areas. If runoff is rapid, little water enters the soil. Vegetation is sparse and grows slowly. Soil formation proceeds slowly and soil horizons, if present, are thin and indistinct. Soils of the Midnight and Mion series are examples. Where runoff is slow, much of the precipitation soaks into the soil. Plants grow abundantly and soil formation proceeds rapidly. Examples of soils that have distinct horizons and dark surface layers because of the influence of moisture are in the Capulin, Gruver, La Brier, and Swastika series.

Aspect and degree of slope also affect soil formation because they affect soil climate. A soil on a steep, north-facing slope formed in a colder climate than a soil on a south-facing slope. Soil drainage, the rate at which internal water is removed from the soil, is also important. Wet, or poorly drained soils, show little evidence of soil forming processes. Soil horizons are indistinct, as in the Saladon series. Some soils become saline through the accumulation of soluble salts. Unless these soils are adequately drained, additional salts accumulate. The saline phases of La Brier, Swastika, and Vermejo are examples of soils that have become saline through the accumulation of salts.

Climate

The general climate of Colfax County is characterized by abundant sunshine and widely fluctuating precipitation that occurs mainly in late spring, in summer, and in early fall. Summers are warm, and winters are cold. The average snowfall on the plains ranges from 20 to 35 inches and in the mountains from 60 to 90 inches or more. Winds are generally from the southwest, but in the winter they may come from the north

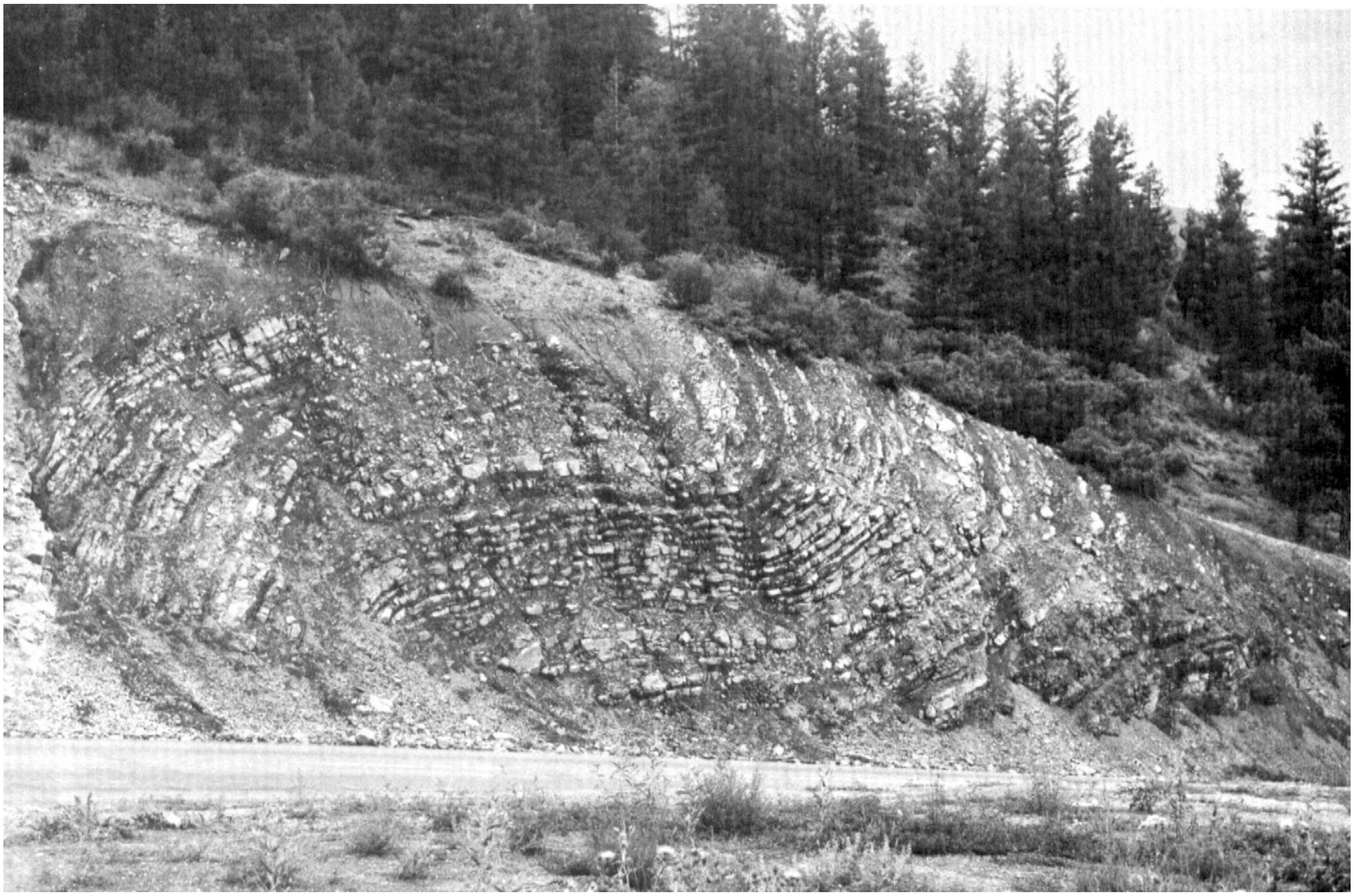


Figure 10.—**Soils differ within short distances according to arrangement and kind of parent material. The mapping unit is Midnight-Rombo-Rock outcrop complex.**

and northeast. Soil climate, as a soil-forming factor, is not necessarily the same as the geographical climate. Soil climate is influenced by relief, elevation, direction and degree of slope, organisms, and effective precipitation.

Since most of the precipitation in Colfax County falls during the growing season, plants are able to use much of the moisture, if other factors are equal, and they grow abundantly and vigorously. Plants affect soil formation by adding organic matter to the soil and by their influence on soil structure.

Individual soils that are near each other on a landscape may show widely different results of soil formation. If rains are gentle, some nearly level soils absorb and use most of the water. If the rain falls during high intensity storms, however, much of the water may run off of nearly level soils. Capulin, Colmor, and Swastika soils, which have a thick, dark surface horizon, are examples of soils that used much of the precipitation during their formation.

Although steeply sloping soils may receive considerable precipitation, they may lose much of it to runoff. Soils of the Midnight and Rombo series are examples.

Some soils in swales and flats use nearly all of the precipitation that falls on them and additional water that runs off of more steeply sloping soils. Soils of the La Brier, Manzano, and Saladon series, which have a dark colored surface layer more than 16 inches thick, are examples.

The high mountainous regions of the county have higher precipitation and less evaporation than the lower foot slope and plains regions. The combined effect of these factors results in the removal of soluble salts, organic matter, and clay from the surface layer. The depth to which these materials are carried and deposited gives some indication of the intensity of soil climate as a soil-forming factor if the other soil-forming factors are equal. The leached surface layer and deep subsoils of the Bundo and Angostura soils are examples.

Past climates may have been significantly cooler and more moist than present ones in Colfax County.

Plants and animals

All forms of life, including man, have an effect on soil formation. Plants add roots, branches, stems, and leaves. Insects and burrowing animals mix the soil. Micro-organisms carry out their functions of decay.

Man applies fertilizers, soil amendments, organic matter, and other materials to the soil, takes crops, forage, lumber, and minerals from it, and changes its shape.

Soils in Colfax County formed under three general kinds of vegetation, which are related to the relief and climate of the area. Each general kind of vegetation has a distinctive influence on soil formation. In the plains, grass vegetation is dominant. Fibrous root systems of grasses produce many root channels and influence structure, add organic matter, and improve or maintain soil tilth and permeability. As a result, surface water is readily able to enter the soil and is stored in the deeper layers. As roots die, organic matter is added to the soil, enriching it and giving it a darker color. Soils of the Capulin, Colmor, La Brier, Swastika, and Torreon series are examples of soils formed under grass vegetation.

On many of the more steeply sloping, stonier areas, with elevations ranging to 8,000 feet, the dominant vegetation is mixed shrubs, pinyon pine, and one-seed juniper. These plants contribute leaves, stems, branches, and seeds to the soil surface. They do not have the many fine roots of grasses. Soils formed under this kind of vegetation, such as the Midnight, Ponil, and Rombo soils, do not have the thick, dark colored surface layers with the high organic-matter content of soils that formed under grass vegetation.

Conifers are the dominant vegetation in the mountainous areas of the county. They contribute leaves, stems, branches, and seeds to the soil surface. As these materials decay, organic acids are formed and hasten the leaching process of basic elements with the help of higher precipitation. The resulting soils often have thick, light colored surfaces and an acidic reaction.

Burrowing animals, earthworms, and insects tunnel into the soil and mix it. They carry surface soils to greater depths in the soil profile and bring fresh parent material to the surface where it is more easily weathered. They also carry sticks, seeds, grass, rocks, bones, feathers, and hair to various places in their burrows. They add their waste products and their bodies when they die to the soil.

A host of specialized micro-organisms in the soil work on plant and animal remains. Each group carries the process of decay one step further. Some micro-organisms are able to fix certain elements and chemical combinations in the soil for use by other organisms.

Man has influenced soil formation both favorably and unfavorably. He has waterlogged some soils and drained others. He has depleted some nutrients and enriched others by adding waste products from livestock operations, commercial fertilizers, and his own garbage. He has overused soils, causing erosion. He has excavated some soils and covered others. He has reclaimed some soils and caused others to turn saline.

Time

Soil horizon differentiation is dependent upon the interaction of soil forming factors and the length of time they have occupied a stable position in the landscape. As the length of time increases, horizon differentiation generally becomes more apparent. Organic-matter content from plants and animals increases in the surface horizons; soluble salts are leached downward, deposited in lower horizons, or removed from the soil profile; and very fine clay is moved downward and built up in the underlying horizons. Soil horizon changes are very slow once the soil nears equilibrium with its environment, provided the soil forming factors remain unchanged.

In Colfax County, soils of the Cypher, Midnight, Mion, Penrose, and Vermejo series have little or no horizon differentiation. The parent material has undergone little change.

The Colmor, Deacon, Dioxice, and Manzano soils show evidence of some horizon differentiation. Soluble salts have leached downward and the soil horizons are recognizable.

Soils in the Carnero, Partri, Swastika, and Torreon series are mature. These soils have definite horizon differentiation. Soluble salts have been leached downward and deposited in the profile and clay has moved into the lower horizons.

Soils in the Dallam and Gruver series also have definite horizon differentiation. In addition to having well defined horizons, clay movement, and leaching of soluble salts, they have subsoils that extend to depths greater than 60 inches.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification and then through the use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories in classification, such as those used in a detailed soil survey, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (*15*).

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system, the differentiae used as a basis for classification are soil properties that can be observed in the field or that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the results of soil genesis or are effects on soil genesis. In table 14, the soil series of Colfax County are placed in categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differentiae for the orders are based on the kind and degree of the dominant sets of soil forming processes that have occurred. Each order is identified by a word of

three or four syllables ending in *sol.* An example is Mollisol. The Swastika series, an important soil in the county, belongs to the order Mollisols. It formed under grass vegetation on uplands and has the high organic-matter content and darkened surface layers required for this order. The Swastika soil is rich in the base elements such as calcium, magnesium, and potassium.

SUBORDER. Each order is divided into suborders that are based primarily on properties that influence soil genesis and that are important to plant growth, or that were selected to reflect what seemed to be the most important variables within the orders. Each suborder is identified by a word of two syllables. The last syllable indicates the order. An example is Ustoll (*Ust,* meaning dry, plus *oll,* from Mollisol). In addition to meeting the requirements for a Mollisol, the Swastika series meets the more restrictive requirements of an Ustoll. It is a well drained soil. It has limited precipitation, but the precipitation falls mainly during the growing season. Swastika soils have a mean annual soil tempearture of 47° to 53° F.

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons, soil moisture and temperature regimes, and in base status. The names of great groups have three or four syllables and end with the name of the suborder. A prefix added to the name suggests something about the properties and soil. An example is Argiustolls (*Arg,* meaning an illuvial horizon of silicate clays, plus *ustoll,* meaning dry Mollisols). Soils in the Swastika series have strong argillic (illuvial) horizons. Soil forming processes, mainly percolating water, have removed clay minerals from the surface layers and redeposited them on sand grains, rock fragments, soil peds, and in pores in underlying horizons. Presence of the argillic horizon implies that the Swastika soil has been in place over a long period of time and has had little mixing by burrowing animals and insects.

SUBGROUP. Each great group is divided into three kinds of subgroups: the central (typic) concept of the great groups (not necessarily the most extensive subgroup) ; the intergrades, or transitional forms to other orders, suborders, or great groups; and extra grade subgroups that have some properties that are representative of the great groups but that do not indicate transitions to any other known kind of soil. Each subgroup is identified by the name of the great group preceded by one or more adjectives. The adjective Typic is used for the subgroup that is thought to typify the great group. The Swastika series is in the Aridic subgroup, thus Aridic Argiustoll. The adjective means that Swastika soils are on the drier end of the great group, Argiustolls. Swastika soils are dry in some parts of the zone between 4 and 12 inches, where more than half the time the soil temperature exceeds 41° F. This is the point where biological activities in the soil stop or become insignificant. The grasses under which Swastika formed belong to the short species.

FAMILY. Soil families are established within a subgroup that has similar enough physical and chemical properties that responses to management and manipulation for use are nearly the same for comparable phases. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineralogy, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, slope of soil, and permanent cracks.

A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for particle size, mineralogy, reaction, and so on, that are used as family differentiae. See table 14. The example of Swastika soils is classified as fine, mixed, mesic Aridic Argiustolls. The adjective "fine" means that the fine earth fraction of the family control section is 35 to 60 percent clay. In the Swastika series, this is the upper 20 inches of the argillic horizon or the entire argillic horizon if it is less than 20 inches thick. The adjective "mixed" means that in the family control section, there is a mixture of minerals with less than 40 percent of any one mineral except quartz. The adjective "mesic" refers to temperature and means that the mean annual soil temperature is between 47° and 59° F.

SERIES. Families are divided into soil series. The series is a group of soils that formed in a particular kind of parent material and that has horizons. They have similar differentiating characteristics, such as the texture of the surface layer and the arrangement of the soil profile. Among the similar characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition. Series names are place names taken from the area where the series was first described. The Raton series, for example, was first described on Johnson Mesa in 1970. Since it was not within the range of any known soil series, it was established as a new and distinct soil series.

The Swastika series was also first described in Colfax County. In addition to the increasing restrictions placed upon the definition from the order down through the family, further restrictions are placed upon it at the series level. In order to be in the Swastika series, a soil must have a solum thickness between 24 and 40 inches. The darkened surface layer must be between 7 and 20 inches thick. The texture of the subsoil must be clay, silty clay, or silty clay loam that is 35 to 50 percent clay in the fine earth fraction. The surface horizon, however, may be a silt loam, silty clay loam, or fine sandy loam.

The classification of the soil series mapped in Colfax County is given in table 14.

Environmental Features

Colfax County is in the northeastern part of New Mexico. It is bounded on the north by Colorado, on the east by Union County, on the south by Harding and Mora Counties, and on the west by Taos County. Part of the county, lying west of a line from Raton to Cimarron and then south to the county line, is mountainous. East of this line are nearly level to gently rolling plains. A few moderately steep to steep mountain peaks are scattered over the plains area in the eastern part of the survey area. A relatively extensive area of high mesas bounded by steep cliffs is in the northeastern part of the county. Elevations range from 5,500 feet, where the Canadian River crosses the south county line, to 12,580 feet at the top of Little Costill Peak.

TABLE 14.—*Classification of the soils*

Soil name	Family or higher taxonomic class
Abreu	Loamy-skeletal, mixed Typic Eutroboralfs
Angostura	Loamy-skeletal, mixed Typic Cryoboralfs
Apache	Loamy, mixed, mesic Lithic Haplustolls
Aridic Argiustolls	Aridic Argiustolls
Ayon	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Bandera	Cindery Torriorthentic Haploborolls
Barela	Fine, mixed Typic Argiborolls
Bernal	Loamy, mixed, mesic Lithic Argiustolls
Berthoud	Fine-loamy, mixed, mesic Aridic Ustochrepts
Brycan	Fine-loamy, mixed Cumulic Haploborolls
Bundo	Loamy-skeletal, mixed Typic Paleoboralfs
Burnac	Fine, montmorillonitic Mollic Eutroboralfs
Capulin	Fine-loamy, mixed, mesic Aridic Argiustolls
Carnero	Fine, mixed, mesic Aridic Argiustolls
Colmor	Fine-silty, mixed, mesic Aridic Haplustolls
Cumulic Haplaquolls	Cumulic Haplaquolls
Cypher	Loamy-skeletal, mixed, frigid Lithic Ustochrepts
Dalcan	Clayey-skeletal, montmorillonitic Pachic Argiborolls
Dalhart	Fine-loamy, mixed, mesic Aridic Haplustalfs
Dallam	Fine-loamy, mesic Aridic Paleustalfs
Dargol	Fine, mixed Typic Eutroboralfs
Deacon	Fine-loamy, mixed, mesic Aridic Haplustolls
Des Moines	Clayey-skeletal, montmorillonitic Pachic Argiborolls
Dioxice	Fine-loamy, mixed, mesic Aridic Calciustolls
Etoe	Loamy-skeletal, mixed Typic Paleoboralfs
Etown	Clayey-skeletal, mixed Typic Paleoboralfs
Frolic	Fine-loamy, mixed Cumulic Haploborolls
Fuera	Fine, mixed Typic Eutroboralfs
Gruver	Fine, mixed, mesic Aridic Paleustolls
Hillery	Fine, montmorillonitic Pachic Argiborolls
La Brier	Fine, mixed, mesic Torrertic Argiustolls
Laporte	Loamy, mixed, mesic Lithic Haplustolls
Litle	Fine, mixed, mesic Ustollic Camborthids
Manzano	Fine-loamy, mixed, mesic Cumulic Haplustolls
Meloche	Fine, mixed, mesic Aridic Haplustolls
Midnight	Loamy-skeletal, mixed, nonacid, frigid, shallow Typic Ustorthents
Mion	Clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents
Moreno	Fine, mixed Typic Argiborolls
Morval	Fine-loamy, mixed Aridic Argiborolls
Mughouse	Fine, montmorillonitic, mesic Ustollic Haplargids
Oro Grande	Loamy-skeletal, mixed, mesic Lithic Haplustolls
Partri	Fine, mixed, mesic Aridic Argiustolls
Penrose	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Plack	Loamy, mixed, mesic, shallow Petrocalcic Calciustolls
Ponil	Fine, mixed Typic Eutroboralfs
Raton	Clayey-skeletal, mixed Lithic Argiborolls
Ring	Clayey-skeletal, mixed Mollic Eutroboralfs
Rombo	Fine, mixed, frigid Typic Ustochrepts
Saladon	Fine, montmorillonitic Typic Cryaquolls
Seelez	Coarse-loamy, mixed, nonacid, mesic Typic Ustorthents
Stout	Loamy, mixed, nonacid, frigid Lithic Ustorthents
Swastika	Fine, mixed, mesic Aridic Argiustolls
Tafoya	Clayey-skeletal, mixed, mesic Aridic Argiustolls
Texline	Fine-loamy, mixed, mesic Calciorthidic Paleustolls
Thunderbird	Fine, montmorillonitic, mesic Aridic Argiustolls
Tinaja	Loamy-skeletal, mixed, mesic Aridic Ustochrepts
Tolby	Sandy-skeletal, mixed Typic Cryochrepts
Torreon	Fine, montmorillonitic, mesic Aridic Argiustolls
Travessilla	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Tricon	Fine, mixed, mesic Petrocalcic Paleustolls
Ustochrepts	Ustochrepts
Vamer	Clayey, mixed Lithic Eutroboralfs
Vermejo	Fine, mixed (calcareous), mesic Ustic Torriorthents
Wellsville	Fine-loamy, mixed Argic Cryoborolls
Yankee	Fine, mixed Vertic Argiborolls

The county is served by Interstate 25, United States Highways 56 and 64, and a network of State and county roads. The Atcheson, Topeka, and Santa Fe Railroad reached Raton in 1879 and parallels the north-south Interstate 25. There are no regularly scheduled airlines at present, but some air facilities are available. The Greyhound Bus Line provides daily service. The two branches of the historic Santa Fe Trail cross the county.

The chance discovery of copper ore in Baldy Mountain led to the discovery of gold, and a gold rush started about 1866. The gold rush and coal mining, which began in Colfax County about 1869, resulted in the settlement and expansion of several small mining communities.

In the plains area, settlement and development came primarily with ranching and farming enterprises. Cattle grazing expanded rapidly in the late 1880's and early 1900's. Much of the land in the plains area was homesteaded in the early 1900's. Dryfarming was practiced extensively until the drought of the 1930's. Only about 30,000 acres of dry cropland is estimated to be under cultivation at present.

Irrigation companies were formed in those parts of the county where soil and climatic conditions were not favorable for dryfarming. In the early 1900's, irrigation had developed to the point where nearly all available surface water was used, but the amount of land under irrigation has fluctuated considerably since then.

Colfax County supports a variety of industries. These include logging, coal mining, and manufacturing of electronic devices, furniture, metal doors, and portable buildings. Both summer and winter recreational facilities have been provided in the county. Camping, hunting, and lake and stream fishing are popular activities. There are two ski areas in the county. La Mesa Park draws horseracing enthusiasts from many miles away.

Climate[10]

The climate of Colfax County is influenced by two general geographic areas. The portion of the county lying east of a line passing through Raton and Cimarron is an extension of the high Great Plains. Elevations range from 5,500 to 7,000 feet, but several higher peaks and mesas are in the east-central and northeastern parts of the county. The portion of the county lying west of this line is mountainous. Elevations range from 7,000 to over 12,000 feet.

The average annual temperature at Colfax County stations near elevations of 6,000 feet is close to 50° F and at elevations of 7,500 feet close to 45°. At elevations near 8,500 feet or above, however, temperatures drop to nearly 40° and below. Similarly, the average daily maximum temperature ranges from nearly 68° in the lower elevations to nearly 55° or less in the mountains. The average daily minimum temperature ranges from near freezing (32°) in the lower elevations to nearly 20°, or lower, in the high mountains. Extreme maximum temperatures of nearly 100° have been measured at stations at lower elevations, but 90° is seldom exceeded at mountain stations. Extreme minimum temperatures of 20° to 35° below zero have been recorded at most lower elevation stations, and 47° below zero was noted at Eagle Nest on January 1, 1962. The lowest temperature records in the State for several months are held by Eagle Nest and the nearby town of Elizabethtown. Extreme high temperatures of 104° have been measured at Springer on June 29, 1909, and in June 1896, and at nearby Taylor Springs on June 28, 1918.

The general pattern of average monthly and annual temperatures for Springer is shown in table 15. This pattern generally applies to that major portion of Colfax County below an elevation of 7,000 feet. This includes most populated areas and areas of agricultural and ranching activities.

Figure 11 shows the probability or occurrence of dates of selected threshold temperatures in spring and autumn. Select a given temperature threshold, which is indicated by a diagonal line, and follow it to the point where it intersects the specified calendar date. Then note the percent probability, shown in the vertical column to the left, of that temperature occurring before or after the specified calendar date. The average date is shown as the 50 percent probability. Data in figure 11 are based on records kept at Springer in Colfax County. The temperature thresholds of 36° and 40° are for the period 1934–63. The rest are for the period 1921–50.

At Springer, the average number of days between the last freezing or lower temperature in spring and first freezing or lower temperature in fall is 151 days. This is often called the "growing season." Temperature threshold dates may vary considerably in short distances because of differences in local topography or other conditions. The average growing season at Raton airport is 144 days, while at the Raton filter plant it is 154 days. Differences of as much as 2 weeks may be noted in a given year.

Days with temperature of 90° or more are rare in the mountains, but occur on an average of as many as 60 days per year in the lower elevations, mostly in summer but occasionally in May and September. Minimum daily temperatures of freezing or lower occur on an annual average of one-half of the days in the lower elevations and on an annual average of over 60 percent of the days in the mountains. The average length of the growing season at Eagle Nest is slightly over 1 month. On the average, at least 1 day has a minimum temperature of 32° or lower each month.

Colfax County has an average annual precipitation of near 15 inches in elevations of about 6,000 feet and below, about 1 inch more at elevations near 7,000 feet and in some mountain valleys, and about 20 inches or more at elevations above 9,000 feet and in the vicinity of Lake Maloya. Eighteen years of rainfall records at Lake Maloya show an average annual precipitation of 22.50 inches, one of the higher averages in the State. About 8 miles west of the Colfax County border, in the Sangre de Cristo Mountains of Taos County, the annual average precipitation is nearly 24 inches at Midnight Mine at an elevation of 10,420 feet.

The greatest 24-hour total precipitation in New Mexico was 11.28 inches measured at Lake Maloya on May 19, 1955. During the period August 31 through September 1, 1942, 24-hour total amounts of between 6 and 7 inches fell at Blakely Ranch, Dawson, Miami, Raton, and Springer. This resulted from the northward passage over eastern New Mexico of the remains of a

[10] FRANK E. HOUGHTON, State climatologist, New Mexico Department of Commerce, Environmental Science Services Administration, Environmental Data Service.

TABLE 15.—*Temperature and precipitation data*

[All data from Springer, New Mexico, 1931–1960]

Month	Temperature (°F.)				Precipitation (inches)				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average monthly total	One year in 10 will have		Average number of days with precipitation	
			Maximum temperature equal or >	Minimum temperature equal or <		Less than	More than	0.10 in. or more	0.25 in. or more
January	45	12	63	− 5	0.5	0.1	1.0	1	1
February	52	18	68	1	0.3	([3])	1.0	1	([4])
March	57	22	73	14	0.6	0.1	1.8	1	1
April	63	30	81	20	1.1	0.2	2.2	3	2
May	76	41	89	31	2.0	0.5	3.9	4	2
June	86	49	97	41	1.7	0.3	4.4	4	2
July	92	58	99	47	2.4	1.1	3.7	6	3
August	87	53	96	46	3.0	1.7	4.1	6	4
September	84	47	92	36	1.8	0.1	3.5	3	2
October	71	34	84	22	1.3	0.1	3.0	2	1
November	58	20	71	5	0.6	([3])	1.6	2	1
December	48	14	65	− 2	0.3	([3])	0.8	1	1
Year	68	33	98[1]	−14[2]	15.6	20.7	9.5	34	20

[1] Average annual highest temperature.
[2] Average annual lowest temperature.
[3] Less than 0.05 inch.
[4] Less than ½ day.

tropical storm from the Gulf of Mexico. Over a 24-hour period, a total of 5.63 inches was recorded at Raton filter plant on May 19, 1955, and 5.60 inches at Raton airport on June 17, 1965. Since the first records were kept in 1897, an additional five occurrences of 24-hour totals of more than 4 inches and approximately 40 occurrences of 24-hour totals of over 3 inches have been noted at Colfax County stations.

Precipitation totals vary greatly annually and monthly. Annual totals in the Raton area range from under 8 inches in 1896 to over 33 inches in 1941. In June precipitation totals have ranged from only 0.05 inch in 1931 to 11.93 inches in 1965.

The average annual number of days with precipitation equal to 0.10 inch or more is near 30 in the lower elevations and increases to over 50 in the mountains above 7,000 feet. The average annual number of days with precipitation of 0.50 inch or greater is from 5 to 10 days over most of the county, but it increases to 15 or more in the higher mountains and in the vicinity of Lake Maloya.

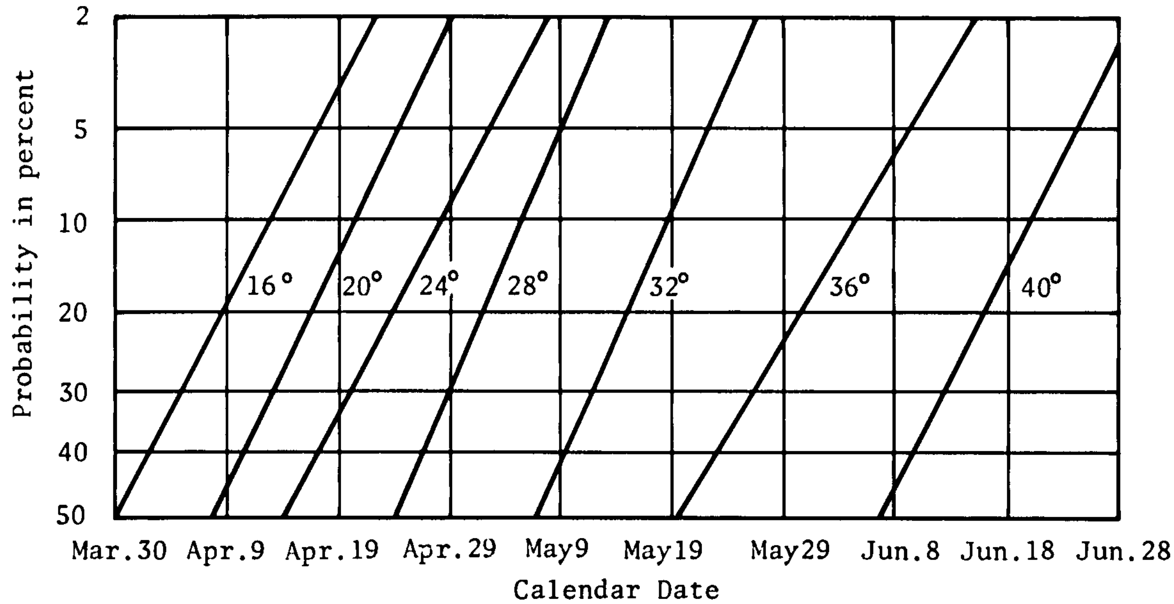
Because of the decrease in temperatures with elevation, much greater variability is noted in total annual snowfall than total precipitation. In the lower, warmer, eastern area the average annual snowfall at Cunico Ranch is 17 inches. Most of the areas at lower elevations have from 20 to 25 inches of snow a year. Snowfall measuring stations above 7,500 feet average from 60 to 90 inches snowfall annually. Greater amounts of snowfall no doubt occur in the highest mountain areas. For the three winter seasons 1962–1965, the average number of days with 1 inch or more of snow on the ground was 17 at Raton airport and 79 at Black Lake.

The southwest-northeast trough of land at lower elevations at Raton increases the wind movement in those directions. Northerly to northeasterly winds predominate in winter. Southerly to southwesterly winds predominate in spring and summer. The average annual windspeed is about 10 miles per hour. It ranges from about 8 miles per hour in summer to about 12 miles per hour in spring. The strongest average winds are from the west quadrant, and the lightest average winds from the east quadrant. Wind velocities exceed 24 miles per hour about 7 percent of the time.

Average annual relative humidity at Raton is 55 percent and ranges from 72 percent at 7:00 a.m. to 37 percent at noon. During spring, the average relative humidity is near 50 percent, while in mid-winter and in August the average is near 60 percent. Strong westerly winds bring warm temperatures and low humidity; the humidity sometimes drops as low as 3 percent. Sunshine occurs at Raton approximately 75 percent of the year, or for nearly 3,200 hours on the average annually. The percentage is about 5 percent less in winter and a little higher in fall.

In the 49 years ending in 1964, only six tornadoes have been reported in Colfax County. One of the most damaging tornadoes in New Mexico history was in 1964. Most tornadoes in Colfax County cause little or no damage.

An average of 75 thunderstorms a year occurs at Raton. More than 90 percent occur in the period May through September. Fog may occur a day or two a month late in fall through early spring but rarely in summer. Nearly 40 percent of the days are clear. The average sky cover is less than four-tenths. Nearly 25 percent of the days are cloudy, and the average sky cover is more than seven-tenths.



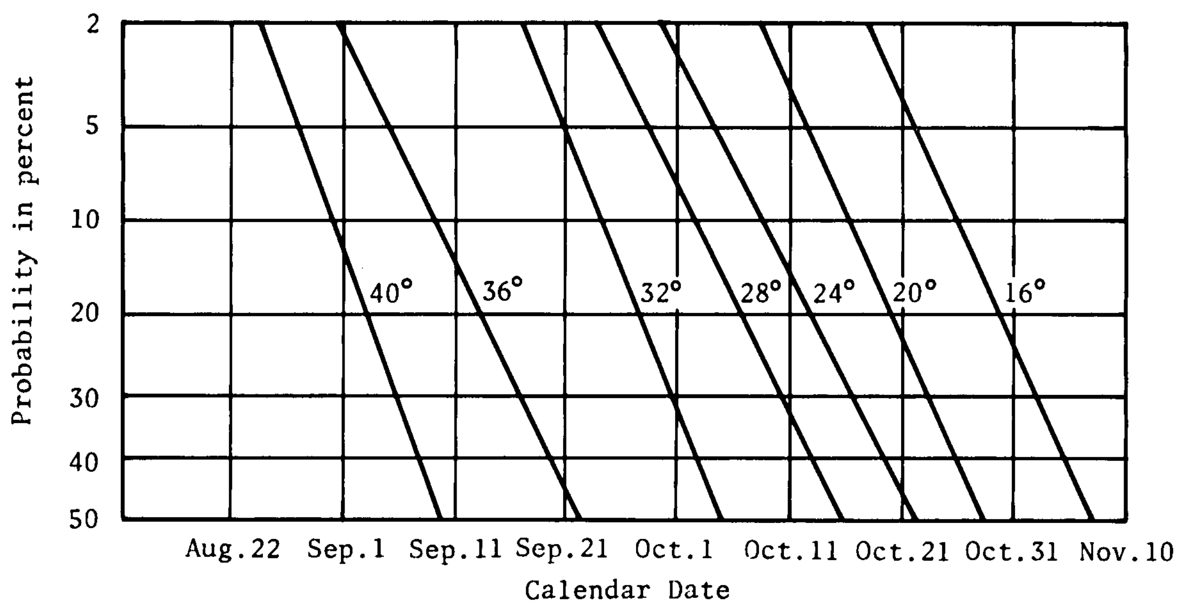


Figure 11.—Top: **Probability of given temperatures after a specified date in spring. Bottom: Probability of given temperatures before a specified date in autumn.**

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor

drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Low strength. Inadequate strength for supporting loads.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in

order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

GUIDE TO MAPPING UNITS

For descriptions of the woodland suitability groups, see pp. 85-89. For the windbreak groups, see pp. 89-90.

NARROWLY DEFINED

Map symbol	Mapping unit	Described on page	Capability unit or subclass: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page
ApD	Apache-Ayon complex, 1 to 9 percent slopes	12	-------	--	VIIs	81	Malpais	71
BhD	Berthoud loam, 3 to 9 percent slopes	17	IIIe-1	78	VIe	81	Loamy	71
CaD	Capulin-Ayon complex, 1 to 9 percent slopes	20	-------	--	VIs	81		
	Capulin silt loam	--	-------	--	-------	--	Loamy	71
	Ayon cobbly silt loam	--	-------	--	-------	--	Malpais	71
CrB	Colmor silt loam, 1 to 3 percent slopes	22	IIe-6	77	VIe	81	Loamy	71
CrC	Colmor silt loam, 3 to 5 percent slopes	23	IIIe-1	78	VIe	81	Loamy	71
CsB	Colmor silty clay loam, 1 to 3 percent slopes	23	IIe-6	77	VIe	81	Clayey	70
CsC	Colmor silty clay loam, 3 to 5 percent slopes	23	IIIe-1	78	VIe	81	Clayey	70
DaB	Dalhart fine sandy loam, 1 to 3 percent slopes	26	IIIe-4	78	VIe	81	Sandy	73
DaC	Dalhart fine sandy loam, 3 to 5 percent slopes	26	IIIe-4	78	VIe	81	Sandy	73
DmB	Dallam loamy fine sand, 0 to 3 percent slopes	27	-------	--	IVe-3	81	Deep Sand	70
DmC2	Dallam loamy fine sand, 1 to 5 percent slopes, eroded	27	-------	--	VIe	81	Deep Sand	70
DnB	Dallam fine sandy loam, 0 to 3 percent slopes	27	-------	--	IIIe-3	80	Sandy	73
DnB2	Dallam fine sandy loam, 0 to 3 percent slopes, eroded	27	-------	--	VIe	81	Sandy	73
DsE	Deacon-Oro Grande-Laporte complex, 3 to 15 percent slopes	29	-------	--	VIIs	81		
	Deacon loam	--	-------	--	-------	--	Loamy	71
	Oro Grande gravelly loam	--	-------	--	-------	--	Hills	71
	Laporte channery loam	--	-------	--	-------	--	Hills	71
DxC	Dioxice fine sandy loam, 1 to 5 percent slopes	31	-------	--	IVe-1 (HP)	80	Sandy	73
DxC2	Dioxice fine sandy loam, 1 to 5 percent slopes, eroded	31	-------	--	VIe	81	Sandy	73
GaB	Gruver fine sandy loam, 0 to 3 percent slopes	36	-------	--	IIIe-3	80	Sandy	73
GbB	Gruver loam, 0 to 3 percent slopes	36	-------	--	IIIe-1	79	Loamy	71
GcB2	Gruver clay loam, 0 to 3 percent slopes, eroded	36	-------	--	VIe	81	Clayey	70
HrD	Hillery stony loam, 1 to 7 percent slopes	37	-------	--	VIIs	81	Mountain Grassland	72
Lb	La Brier silt loam	38	IIs-1	78	IIIe-2	80	Loamy	71
Lc	La Brier silty clay loam, saline	38	IVs-9	79	VIs	81	Salt Flats	73
Lr	La Brier-Rock outcrop complex	38	-------	--	VIe	81		
	La Brier silt loam	--	-------	--	-------	--	Loamy	71
	Rock outcrop	--	-------	--	-------	--	-----------	--
LtB	Litle clay loam, 1 to 3 percent slopes	40	IVe-9	79	VIe	81	Clayey	70

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit or subclass: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page
Ma	Manzano loam	40	IIe-5	77	IIIe-1	79	Loamy	71
Mn	Midnight-Rombo-Rock outcrop complex	42	-------	--	VIIs	81		
	Midnight stony clay loam	--	-------	--	-------	--	Mountain Shale	72
	Rombo cobbly silty clay loam	--	-------	--	-------	--	Mountain Shale	72
	Rock outcrop	--	-------	--	-------	--	--------------	--
MoB	Mion silty clay loam, 1 to 3 percent slopes	43	-------	--	VIe	81	Shallow	74
Mp	Mion-Rock outcrop complex	43	-------	--	VIIe	81		
	Mion silty clay loam	--	-------	--	-------	--	Shallow	74
	Rock outcrop	--	-------	--	-------	--	--------------	--
Mu	Mughouse-Swastika complex	46	-------	--	VIe	81		
	Mughouse stony sandy clay loam	--	-------	--	-------	--	Hills	71
	Swastika silt loam	--	-------	--	-------	--	Loamy	71
Ra	Raton-Barela complex	51	-------	--	VIIs	81		
	Raton stony silt loam	--	-------	--	-------	--	Mountain Stony Loam	72
	Barela stony silt loam	--	-------	--	-------	--	Mountain Grassland	72
Rz	Riverwash-Manzano complex	52	-------	--	VIw	81		
	Riverwash	--	-------	--	-------	--	--------------	--
	Manzano loam	--	-------	--	-------	--	Loamy	71
SaC	Saladon mucky silty clay, 0 to 5 percent slopes	54	-------	--	VIw	81	Meadow	71
SeB	Seelez sandy loam, dark, 0 to 3 percent slopes	54	-------	--	IIIe-3	80	Sandy	73
SfC	Seelez fine sandy loam, 0 to 5 percent slopes	55	-------	--	VIe	81	Sandy	73
SnA	Seelez fine sandy loam, dark, 0 to 1 percent slopes	55	IIe-2	77	VIe	81	Sandy	73
SoA	Swastika silt loam, 0 to 1 percent slopes	56	IIs-1	78	VIs	81	Loamy	71
SpD	Swastika silt loam, 3 to 7 percent slopes	56	IIIe-1	78	VIe	81	Loamy	71
SsB	Swastika silty clay loam, 1 to 3 percent slopes	56	IIIe-8	78	VIe	81	Clayey	70
St	Swastika silty clay loam, saline	56	IVs-9	79	VIs	81	Salt Flats	73
Tr	Travessilla-Rock outcrop complex	62	-------	--	VIIs	81		
	Travessilla stony fine sandy loam	--	-------	--	-------	--	Shallow Sandstone	74
	Rock outcrop	--	-------	--	-------	--	--------------	--
Ve	Vemejo silty clay loam	65	IVs-9	79	VIs	81	Clayey	70
Vm	Vemejo silty clay loam, saline	65	IVs-9	79	VIs	81	Salt Flats	73
Vs2	Vemejo and Swastika soils, eroded	65	-------	--	VIe	81	Clayey	70

BROADLY DEFINED

Map symbol	Mapping unit	Described on page	Capability unit or subclass: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page
AB	Abreu-Cypher association, hilly--	9	------	--	VIIe	81	--------------	--
AG	Angostura association, steep-----	11	------	--	VIIs	81	--------------	--
AN	Angostura-Tolby association, steep-------------------------	12	------	--	VIIs	81	--------------	--
ARF	Aridic Argiustolls-Rock outcrop association, steep------------	13						
	Aridic Argiustolls-----------	--	------	--	VIIe	81	Breaks	69
	Rock outcrop-----------------	--	------	--	VIIIs	81	--------------	--
ARG	Aridic Argiustolls-Rock outcrop complex, very steep------------	13	------	--	VIIs	81		
	Aridic Argiustolls-----------	--	------	--	-------	--	Breaks	69
	Rock outcrop-----------------	--	------	--	-------	--	--------------	--
BA	Bandera association--------------	14						
	Bandera gravelly loam--------	--	------	--	VIIe	81	Cinder	70
	Cinder land------------------	--	------	--	VIIIs	81	--------------	--
BE	Barela-Yankee association--------	15	------	--	-------	--	Mountain Grassland	72
	Barela silt loam-------------	--	------	--	IVe-1 (RM)	80	--------------	--
	Barela stony silt loam-------	--	------	--	VIs	81	--------------	--
	Yankee silt loam-------------	--	------	--	IVe-1 (RM)	80	--------------	--
BR	Brycan association, moderately sloping-----------------------	18	IVe-2	78	IVe-1 (RM)	80		
	Brycan loam, 0 to 3 percent slopes-------------------	--	------	--	-------		Mountain Valley	73
	Brycan loam, 3 to 7 percent slopes-------------------	--	------	--	-------		Mountain Grassland	72
BU	Bundo association, steep---------	19	------	--	VIIe	81	--------------	--
BY	Burnac-Hillery association, sloping-----------------------	20						
	Burnac stony loam------------	--	------	--	VIIs	81	--------------	--
	Hillery silt loam------------	--	------	--	VIe	81	Subalpine Grassland	74
CB	Capulin-Torreon association, moderately sloping-------------	21	------	--	VIe	81	Loamy	71
CP	Carnero-Partri association-------	21	------	--	VIe	81	Loamy	71
CT	Colmor association---------------	23	------	--	VIe	81	Loamy	71
CV	Colmor-Vermejo-Litle association, sloping-----------------------	23	------	--	VIe	81		
	Colmor silt loam-------------	--	------	--	-------	--	Loamy	71
	Vermejo silty clay loam------	--	------	--	-------	--	Clayey	70
	Litle silty clay-------------	--	------	--	-------	--	Clayey	70
CY	Cypher-Bundo association, steep--	24	------	--	VIIe	81	--------------	--
DB	Dalhart-Seelez association, gently sloping----------------	26	------	--	VIe	81	Sandy	73
DO	Dargol-Stout-Vamer association, sloping-----------------------	28	------	--	VIs	81		
	Dargol stony loam------------	--	------	--	-------	--	--------------	--
	Stout cobbly sandy loam------	--	------	--	-------	--	--------------	--
	Vamer stony very fine sandy loam---------------------	--	------	--	-------	--	Mountain Grassland	72
DP	Deacon-Ayon association, sloping-	29						
	Deacon loam------------------	--	------	--	VIe	81	Loamy	71
	Ayon cobbly silt loam--------	--	------	--	VIs	81	Malpais	71

Map symbol	Mapping unit	Described on page	Capability unit or subclass: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page
DR	Deacon-La Brier-Manzano association, sloping	29	-------	--	-------	--	Loamy	71
	Deacon loam	--	IIIe-1	78	VIe	81	--------------	--
	La Brier silt loam	--	IIIe-8	78	IIIe-2	80	--------------	--
	Manzano loam	--	IIe-6	77	IIIe-1	79	--------------	--
DT	Des Moines association, steep	30	-------	--	VIIs	81	Mountain Stony Loam	72
EE	Etoe-Etown association, steep	32	-------	--	VIIs	81	--------------	--
FC	Frolic association, gently sloping	34	-------	--	-------	--	Meadow	71
	Frolic very fine sandy loam	--	IVw-2	79	IVw-1	81	--------------	--
	Cumulic Haplaquolls	--	-------	--	VIw	81	--------------	--
FD	Fuera-Burnac association, steep	35						
	Fuera cobbly loam	--	-------	--	VIIe	81	--------------	--
	Burnac stony loam	--	-------	--	VIIs	81	--------------	--
FE	Fuera-Dargol-Vamer association, steep	35						
	Fuera cobbly loam	--	-------	--	VIIe	81	--------------	--
	Dargol stony loam	--	-------	--	VIIs	81	--------------	--
	Vamer stony loam	--	-------	--	VIs	81	Mountain Grassland	72
LSF	Laporte channery loam, 5 to 35 percent slopes	39	-------	--	VIIs	81	Hills	71
MB	Manzano association, gently sloping	40						
	Manzano loam	--	-------	--	IIIe-1	79	Loamy	71
	Manzano fine sandy loam	--	-------	--	IVe-1 (HP)	80	Sandy	73
MR	Mion-Litle association, strongly sloping	43	-------	--	VIe	81	--------------	--
	Mion silt loam	--	-------	--	-------	--	Shallow	74
	Litle silt loam	--	-------	--	-------	--	Loamy	71
MS	Moreno-Cypher association, hilly	44						
	Moreno loam	--	-------	--	VIe	81	Mountain Grassland	72
	Cypher gravelly loam	--	-------	--	VIIe	81	--------------	--
MT	Morval-Moreno association, sloping	45	-------	--	-------	--	Mountain Grassland	72
	Morval clay loam	--	IVe-2	78	IVe-1 (RM)	80	--------------	--
	Moreno loam, 3 to 30 percent slopes	--	-------	--	VIe	81	--------------	--
OG	Oro Grande-Meloche association, steep	47	-------	--	-------	--	Breaks	69
	Oro Grande very stony loam	--	-------	--	VIIs	81	--------------	--
	Meloche stony silty clay loam	--	-------	--	VIIe	81	--------------	--
OT	Oro Grande-Tafoya association	47	-------	--	-------	--	Breaks	69
	Oro Grande gravelly loam	--	-------	--	VIIs	81	--------------	--
	Tafoya stony loam	--	-------	--	VIIe	81	--------------	--
PE	Penrose loam, 0 to 9 percent slopes	48	-------	--	VIIs	81	Shallow	74
PL	Plack fine sandy loam, 0 to 9 percent slopes	49	-------	--	VIIs	81	Shallow	74

Map symbol	Mapping unit	Described on page	Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page
PV	Ponil-Vamer association, hilly--	50	-------	--				
	Ponil stony loam------------	--	-------	--	VIIs	81	Mountain Shale	72
	Vamer stony loam------------	--	-------	--	VIs	81	Mountain Grassland	72
RD	Raton-Dalcan association, rolling----------------------	51	-------	--	VIIs	81	Mountain Stony Loam	72
RE	Raton-Wellsville association, steep-----------------------	51	-------	--			Subalpine Grassland	74
	Raton cobbly loam-----------	--	-------	--	VIIs	81	--------------	--
	Wellsville cobbly loam------	--	-------	--	VIIe	81	--------------	--
RG	Ring-Brycan association, moderately sloping----------------	52						
	Ring cobbly loam------------	--	-------	--	VIs	81	--------------	--
	Brycan loam-----------------	--	IVe-2	78	IVe-1 (RM)	80	Mountain Valley	73
RV	Riverwash----------------------	52	-------	--	VIIIw	81	--------------	--
SW	Swastika association, gently sloping----------------------	56	-------	--	VIe	81	Loamy	71
SX	Swastika-La Brier association, saline----------------------	57	-------	--	VIs	81	Salt Flats	73
TED	Texline fine sandy loam, 0 to 7 percent slopes---------------	58	-------	--	VIe	81	Sandy	73
TH	Thunderbird-Torreon association, undulating------------------	59	-------	--	VIe	81		
	Thunderbird stony silt loam-	--	-------	--	-------	--	Malpais	71
	Torreon silt loam-----------	--	-------	--	-------	--	Loamy	71
TNE	Tinaja gravelly sandy clay loam, 3 to 25 percent slopes--------	60	-------	--	VIe	81	Shallow	74
TO	Torreon-Deacon association, sloping---------------------	62	-------	--	VIe	81	Loamy	71
TS	Travessilla-Bernal-Rock outcrop, association-----------------	62						
	Travessilla fine sandy loam-	--	-------	--	VIIs	81	Shallow Sandstone	74
	Bernal loam-----------------	--	-------	--	VIs	81	Shallow	74
	Rock outcrop----------------	--	-------	--	VIIIs	81	--------------	--
TX	Tricon-Plack association, gently sloping----------------------	63						
	Tricon silt loam------------	--	-------	--	VIe	81	Loamy	71
	Plack loam------------------	--	-------	--	VIIs	81	Shallow	74
US	Ustochrepts-Rock outcrop complex-	63	-------	--	VIIe	81		
	Ustochrepts-----------------	--	-------	--	--------	--	Mountain Shale	72
	Rock outcrop----------------	--	-------	--	-------	--	--------------	--
WEG	Wellsville cobbly loam, 10 to 50 percent slopes----------------	68	-------	--	VIIe	81	Subalpine Grassland	74

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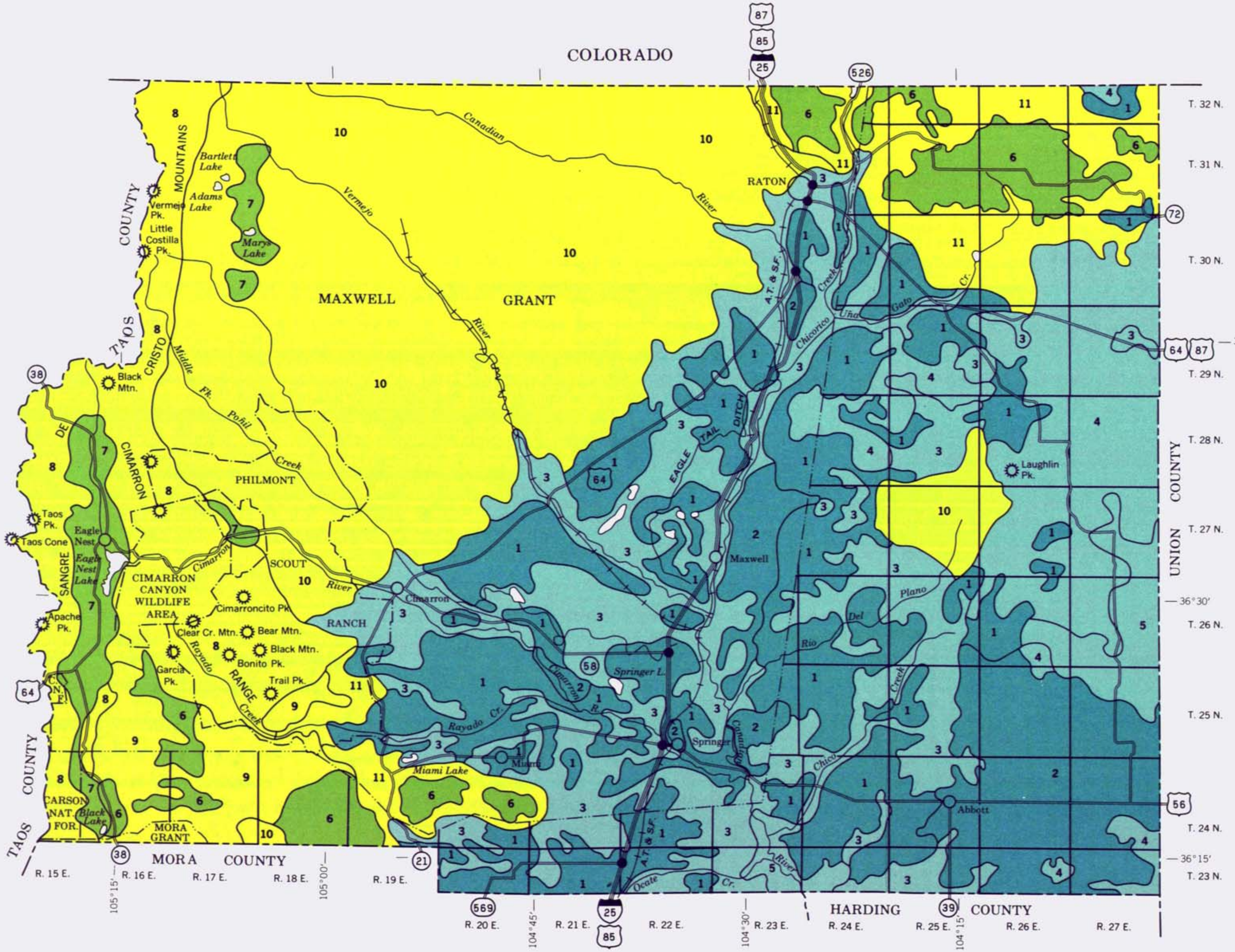


SOIL ASSOCIATIONS*

DEEP, WELL DRAINED, LEVEL TO MODERATELY SLOPING, WARM LOAMY SOILS ON UPLANDS

1 — Colmor-Swastika association: Level to moderately sloping silt loams and silty clay loams

2 — Gruver-Dalhart-Dioxice association: Level to gently sloping and undulating fine sandy loams, loams, and clay loams

DEEP TO VERY SHALLOW, WELL DRAINED AND MODERATELY WELL DRAINED, LEVEL TO HILLY, WARM LOAMY SOILS ON UPLANDS

3 — Mion-Vermejo-Little association: Shallow to deep, well drained and moderately well drained, level to hilly silt loams and silty clay loams

4 — Capulin-Torreon association: Deep, well drained, level to gently rolling silt loams

5 — Travessilla-Carnero-Partri association: Very shallow to deep, well drained, level to hilly stony loams, fine sandy loams, loams, and silt loams

DEEP TO VERY SHALLOW, WELL DRAINED, LEVEL TO STRONGLY SLOPING, COLD LOAMY SOILS ON UPLANDS

6 — Raton-Barela association: Very shallow and deep, level to strongly sloping stony silt loams, cobbly loams, and silt loams

7 — Morval-Moreno-Brycan association: Deep, level to strongly sloping clay loams and loams

DEEP TO VERY SHALLOW, WELL DRAINED AND EXCESSIVELY DRAINED, NEARLY LEVEL TO VERY STEEP, COLD AND WARM LOAMY SOILS ON UPLANDS AND ROCK OUTCROP

8 — Bundo-Angostura-Tolby association: Deep, well drained and excessively drained, moderately steep to very steep, cold gravelly sandy loams, stony sandy loams, stony fine sandy loams, and stony loams

9 — Burnac-Fuera association: Deep, well drained, nearly level to very steep, cold stony loams and cobbly loams

10 — Dargol-Fuera-Vamer association: Very shallow to deep, well drained, nearly level to very steep, cold stony loams, stony very fine sandy loams, and cobbly loams

11 — Aridic Argiustolls-Rock outcrop association: Shallow to deep, well drained, moderately steep to very steep, warm soils and Rock outcrop

*The texture in the descriptive headings refers to the surface layer of the major soils in each association.

Compiled 1981

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

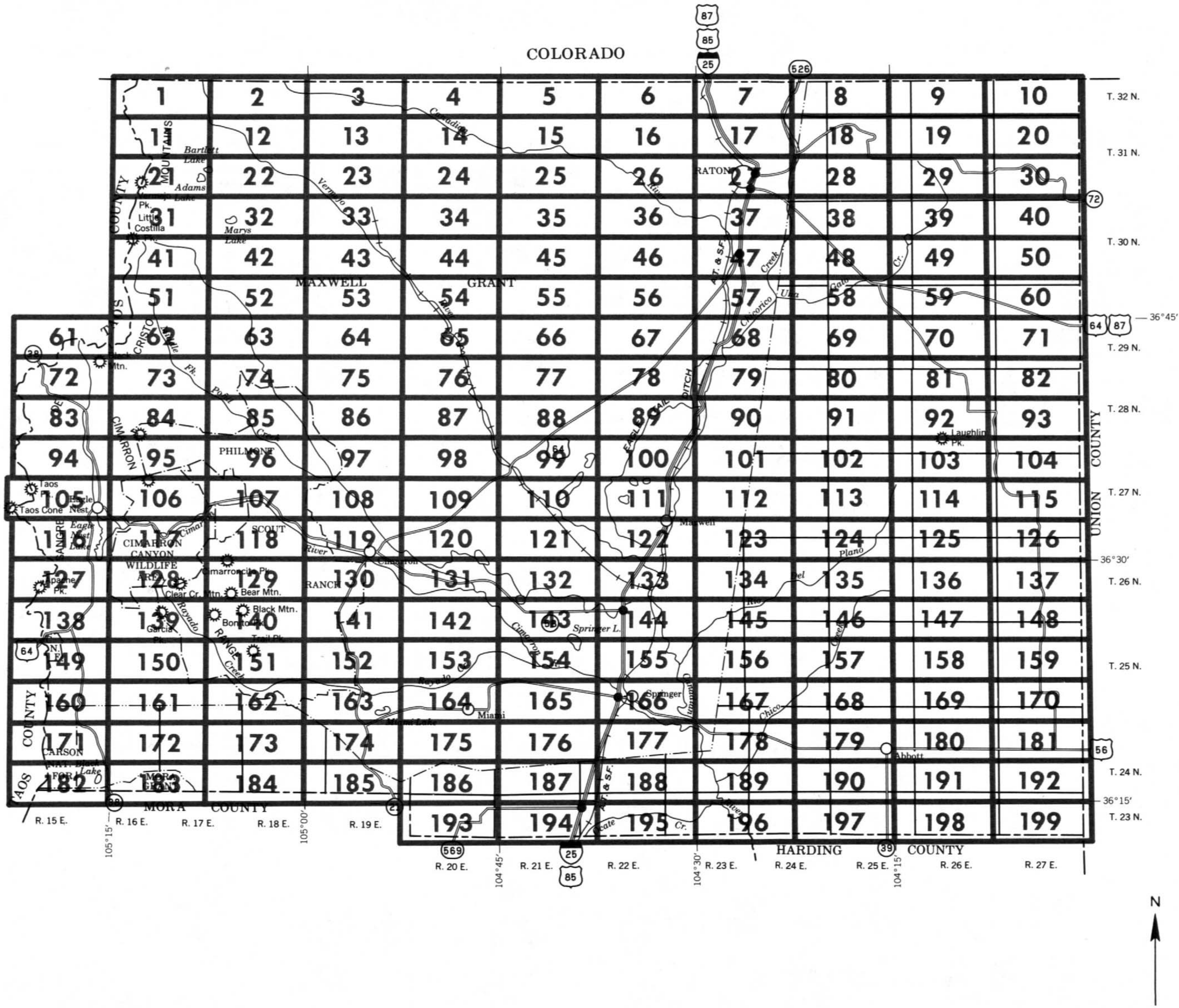
COLFAX COUNTY, NEW MEXICO

Scale 1:506,880

1 0 1 2 3 4 5 6 7 Miles

N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

COLFAX COUNTY, NEW MEXICO

Scale 1: 506,880

1 0 1 2 3 4 5 6 7 Miles

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined; otherwise, it is a small letter. The third letter, always a capital, A, B, C, D, E, or F, shows the slope class. Most symbols without slope letters are those of nearly level soils, but some are for soil associations that have fair to considerable range of slope. A final number, 2, in the symbol shows that the soil has been eroded.

SYMBOL	NAME
AB	Abreu-Cypher association, hilly
AG	Angostura association, steep
AN	Angostura-Tolby association, steep
ApD	Apache-Ayon complex, 1 to 9 percent slopes
ARF	Aridic Argiustolls-Rock outcrop association, steep
ARG	Aridic Argiustolls-Rock outcrop complex, very steep
BA	Bandera association
BE	Barela-Yankee association
BhD	Berthoud loam, 3 to 9 percent slopes
BR	Brycan association, moderately sloping
BU	Bundo association, steep
BY	Burnac-Hillery association, sloping
CaD	Capulin-Ayon complex, 1 to 9 percent slopes
CB	Capulin-Torreon association, moderately sloping
CP	Carnero-Partri association
CrB	Colmor silt loam, 1 to 3 percent slopes
CrC	Colmor silt loam, 3 to 5 percent slopes
CsB	Colmor silty clay loam, 1 to 3 percent slopes
CsC	Colmor silty clay loam, 3 to 5 percent slopes
CT	Colmor association
CV	Colmor-Vermejo-Litle association, sloping
CY	Cypher-Bundo association, steep
DaB	Dalhart fine sandy loam, 1 to 3 percent slopes
DaC	Dalhart fine sandy loam, 3 to 5 percent slopes
DB	Dalhart-Seelez association, gently sloping
DmB	Dallam loamy fine sand, 0 to 3 percent slopes
DmC2	Dallam loamy fine sand, 1 to 5 percent slopes, eroded
DnB	Dallam fine sandy loam, 0 to 3 percent slopes
DnB2	Dallam fine sandy loam, 0 to 3 percent slopes, eroded
DO	Dargol-Stout-Vamer association, sloping
DP	Deacon-Ayon association, sloping
DR	Deacon-La Brier-Manzano association, sloping
DsE	Deacon-Oro Grande-Laporte complex, 3 to 15 percent slopes
DT	Des Moines association, steep
DxC	Dioxice fine sandy loam, 1 to 5 percent slopes
DxC2	Dioxice fine sandy loam, 1 to 5 percent slopes, eroded
EE	Etoe-Etown association, steep
FC	Frolic association, gently sloping
FD	Fuera-Burnac association, steep
FE	Fuera-Dargol-Vamer association, steep
GaB	Gruver fine sandy loam, 0 to 3 percent slopes
GbB	Gruver loam, 0 to 3 percent slopes
GcB2	Gruver clay loam, 0 to 3 percent slopes, eroded
HrD	Hillery stony loam, 1 to 7 percent slopes
Lb	La Brier silt loam
Lc	La Brier silty clay loam, saline
Lr	La Brier-Rock outcrop complex
LSF	Laporte channery loam, 5 to 35 percent slopes
LtB	Litle clay loam, 1 to 3 percent slopes
Ma	Manzano loam
MB	Manzano association, gently sloping
Mn	Midnight-Rombo-Rock outcrop complex
MoB	Mion silty clay loam, 1 to 3 percent slopes
Mp	Mion-Rock outcrop complex
MR	Mion-Litle association, strongly sloping
MS	Moreno-Cypher association, hilly
MT	Morval-Moreno association, sloping
Mu	Mughouse-Swastika complex
OG	Oro Grande-Meloche association, steep
OT	Oro Grande-Tafoya association
PE	Penrose loam, 0 to 9 percent slopes
PL	Plack fine sandy loam, 0 to 9 percent slopes
PV	Ponil-Vamer association, hilly
Ra	Raton-Barela complex
RD	Raton-Dalcan association, rolling
RE	Raton-Wellsville association, steep
RG	Ring-Brycan association, moderately sloping
RV	Riverwash
Rz	Riverwash-Manzano complex
SaC	Saladon mucky silty clay, 0 to 5 percent slopes
SeB	Seelez sandy loam, dark, 0 to 3 percent slopes
SfC	Seelez fine sandy loam, 0 to 5 percent slopes
SnA	Seelez fine sandy loam, dark, 0 to 1 percent slopes
SoA	Swastika silt loam, 0 to 1 percent slopes
SpD	Swastika silt loam, 3 to 7 percent slopes
SsB	Swastika silty clay loam, 1 to 3 percent slopes
St	Swastika silty clay loam, saline
SW	Swastika association, gently sloping
SX	Swastika-La Brier association, saline
TED	Texline fine sandy loam, 0 to 7 percent slopes
TH	Thunderbird-Torreon association, undulating
TNE	Tinaja gravelly sandy clay loam, 3 to 25 percent slopes
TO	Torreon-Deacon association, sloping
Tr	Travessilla-Rock outcrop complex
TS	Travessilla-Bernal-Rock outcrop association
TX	Tricon-Plack association, gently sloping
US	Ustochrepts-Rock outcrop complex
Ve	Vermejo silty clay loam
Vm	Vermejo silty clay loam, saline
Vs2	Vermejo and Swastika soils, eroded
WEG	Wellsville cobbly loam, 10 to 50 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit — G.P.
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — SvE 107

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Area receiving extra water (1 acre)
- Shallow area (1 acre)
- Alluvial land (1 acre)

1

N

COLFAX COUNTY, NEW MEXICO NO. 1

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Coordinate grid ticks and land division corners, if shown, are approximately positioned

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

2

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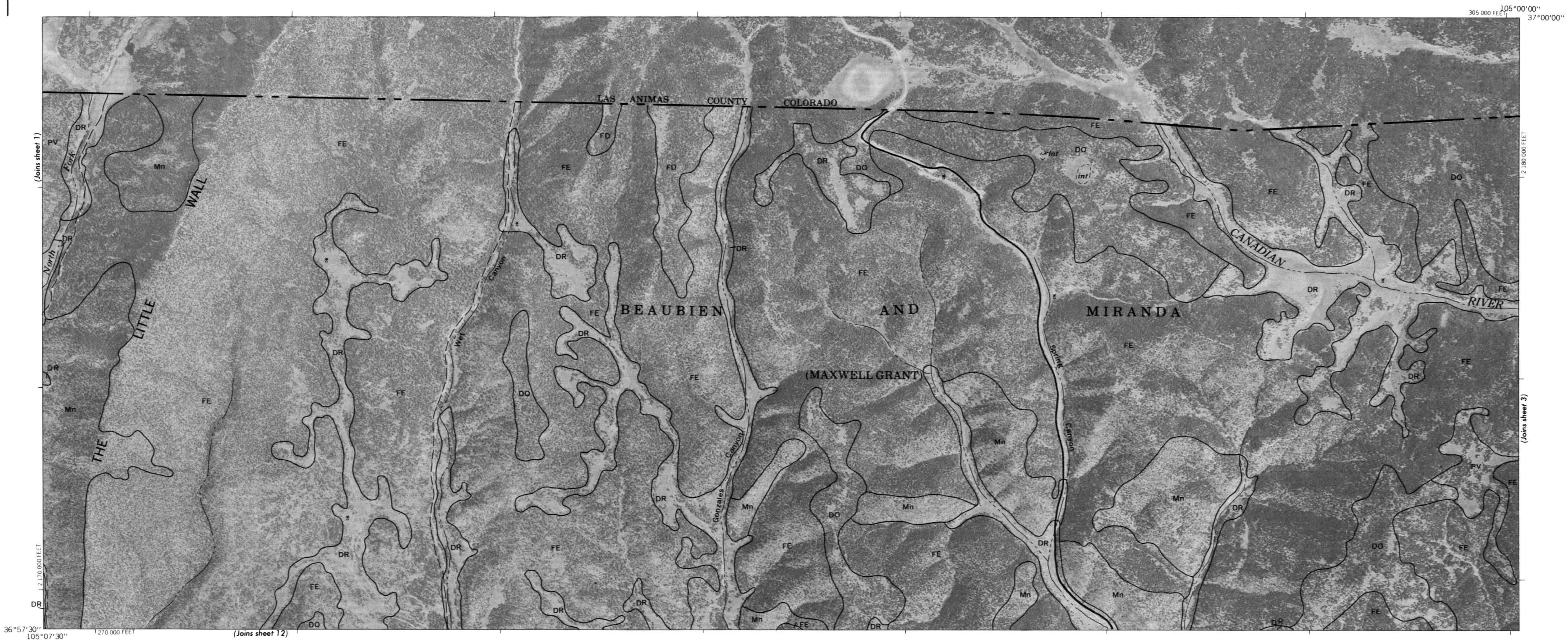
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 2



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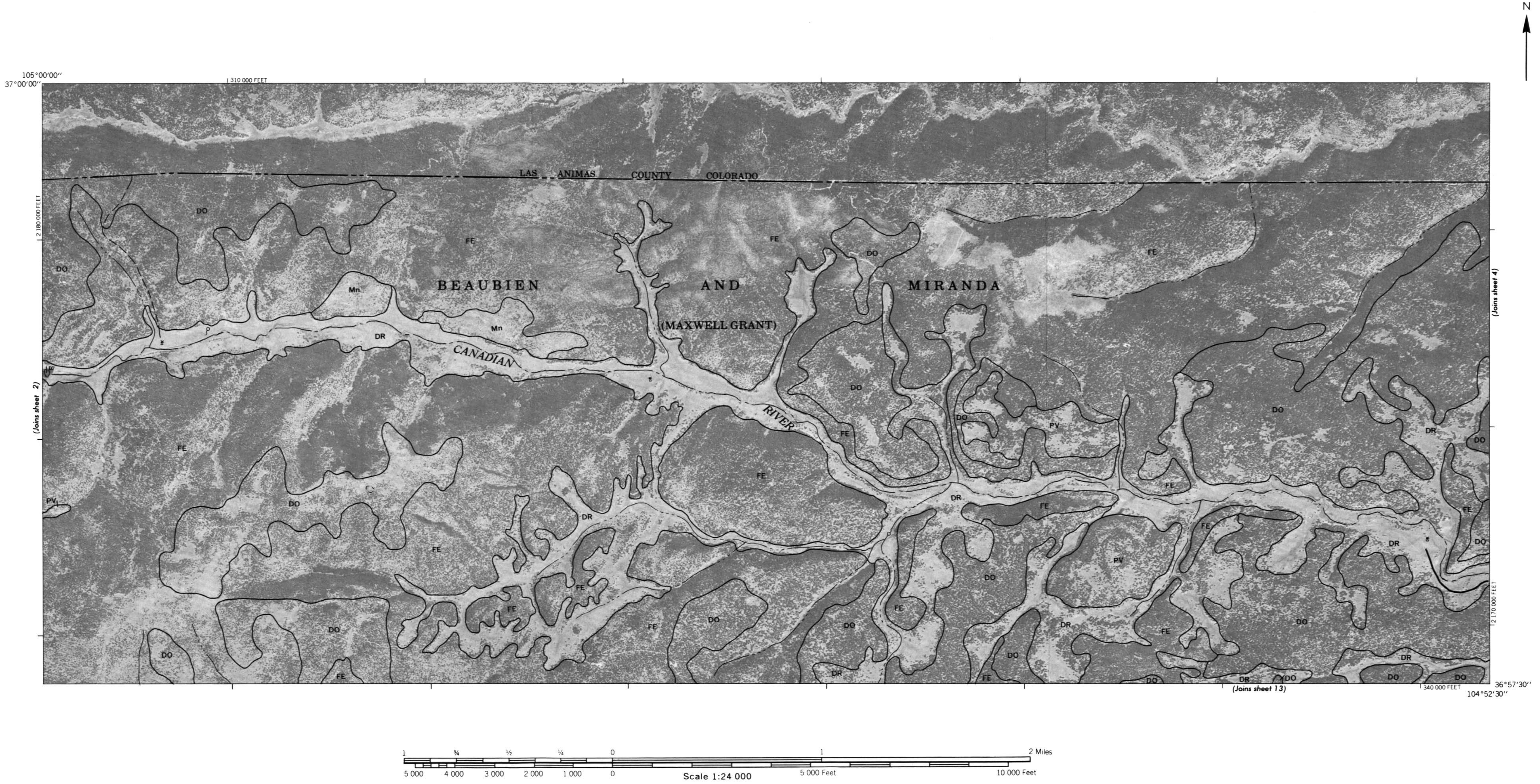
COLFAX COUNTY, NEW MEXICO NO. 2



COLFAX COUNTY, NEW MEXICO NO. 3

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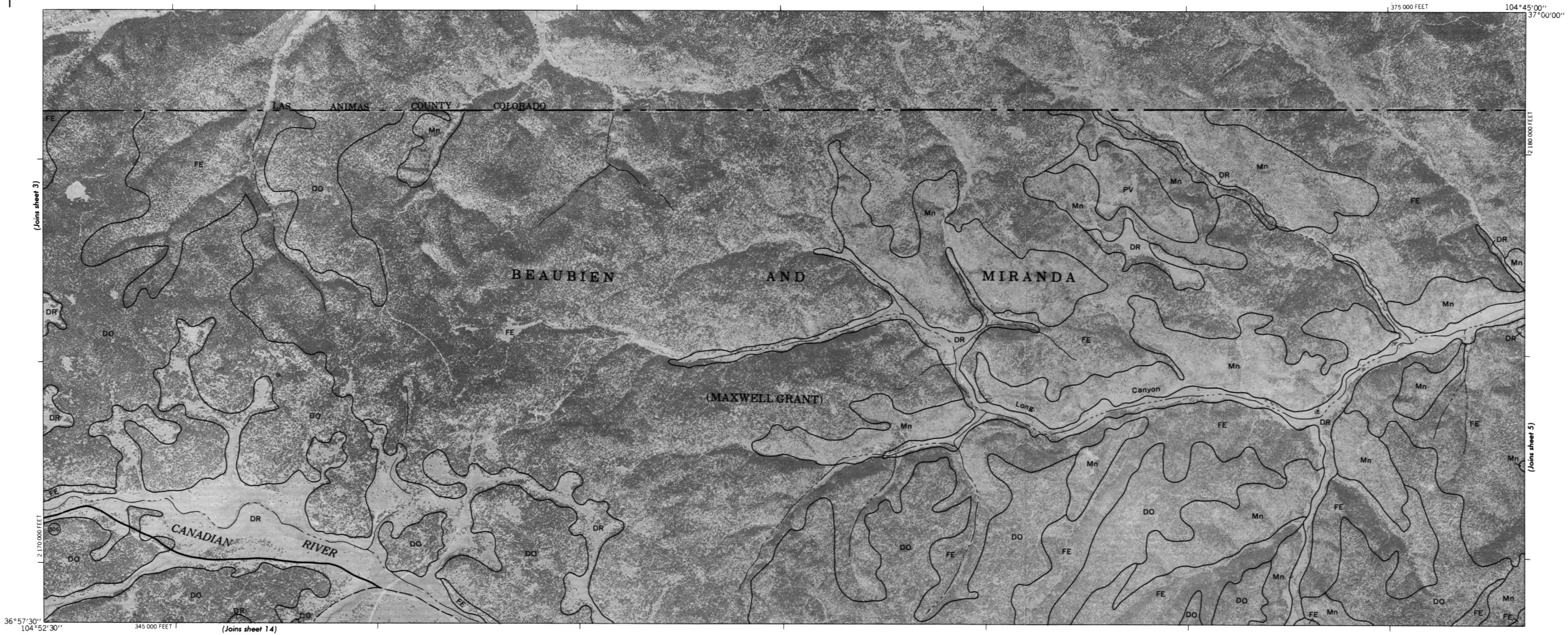
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 4



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Scale 1:24 000

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5

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COLFAX COUNTY, NEW MEXICO NO. 5

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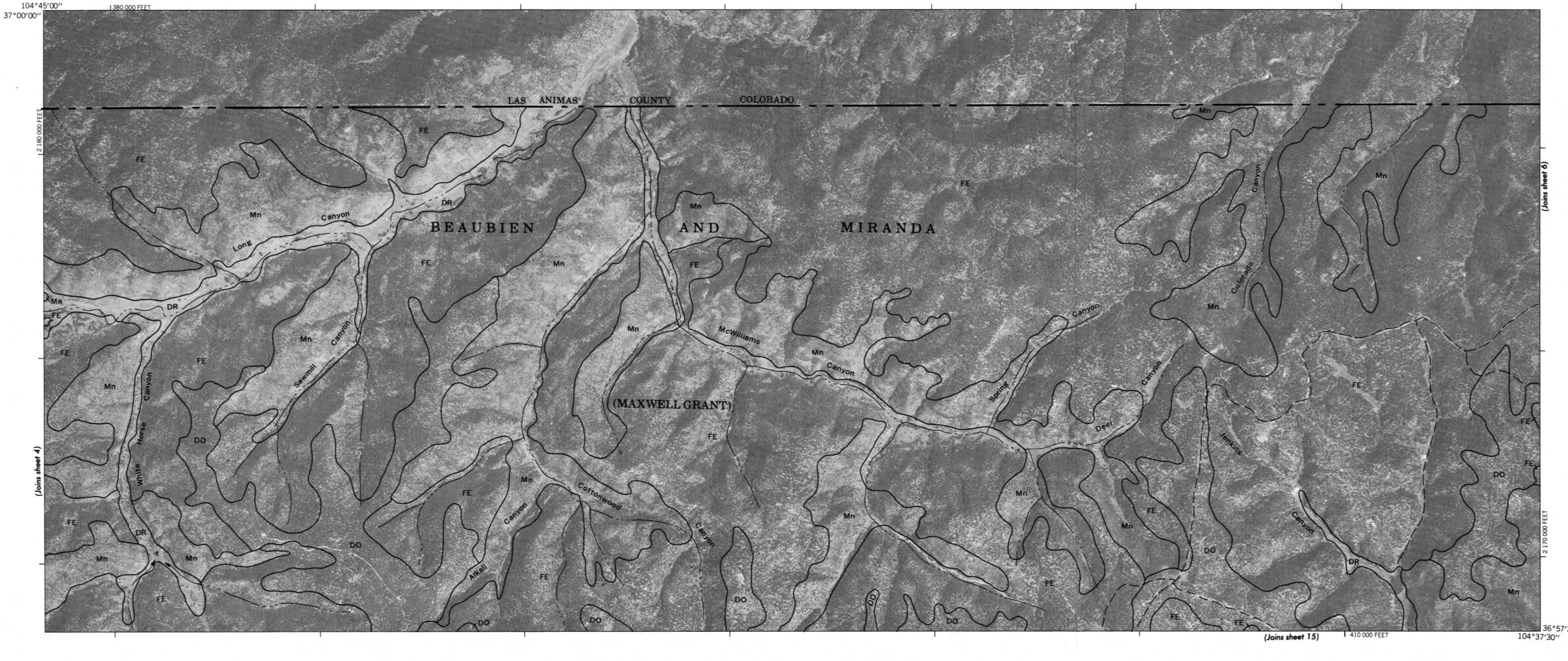

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Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 6

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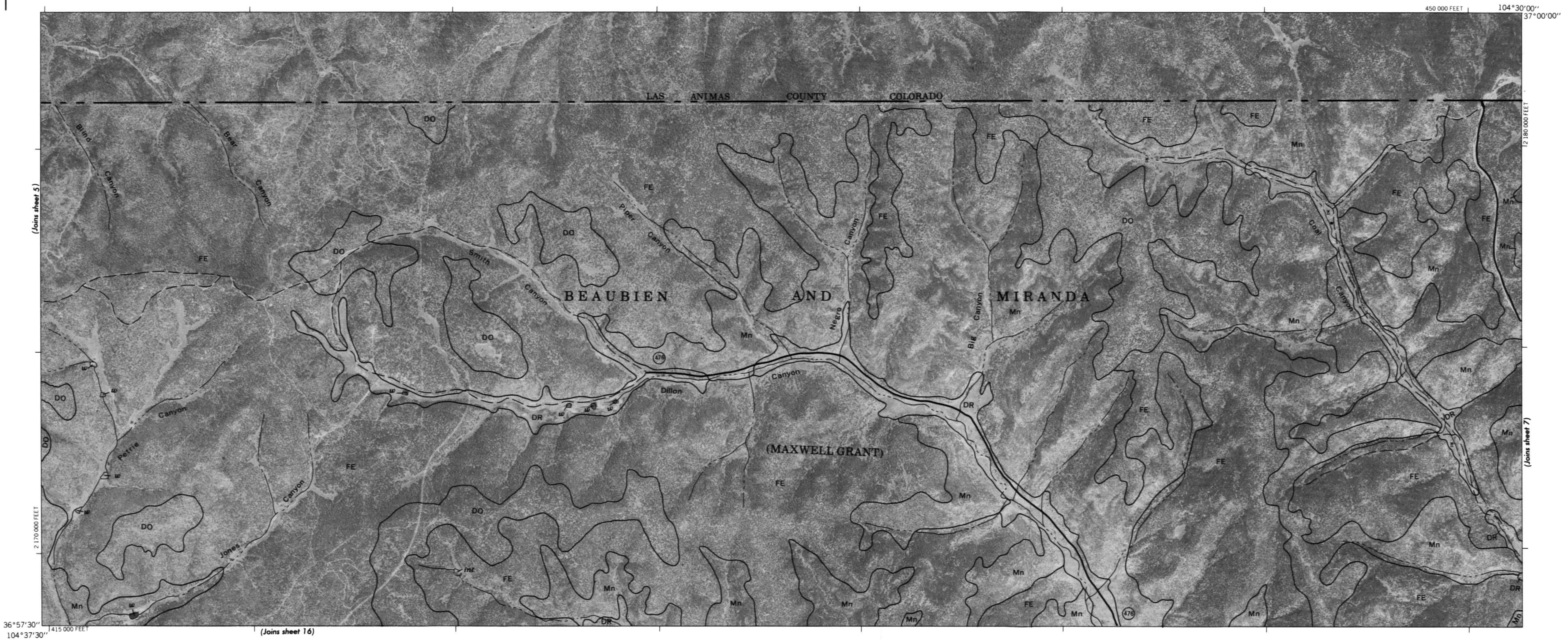

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Scale 1:24 000

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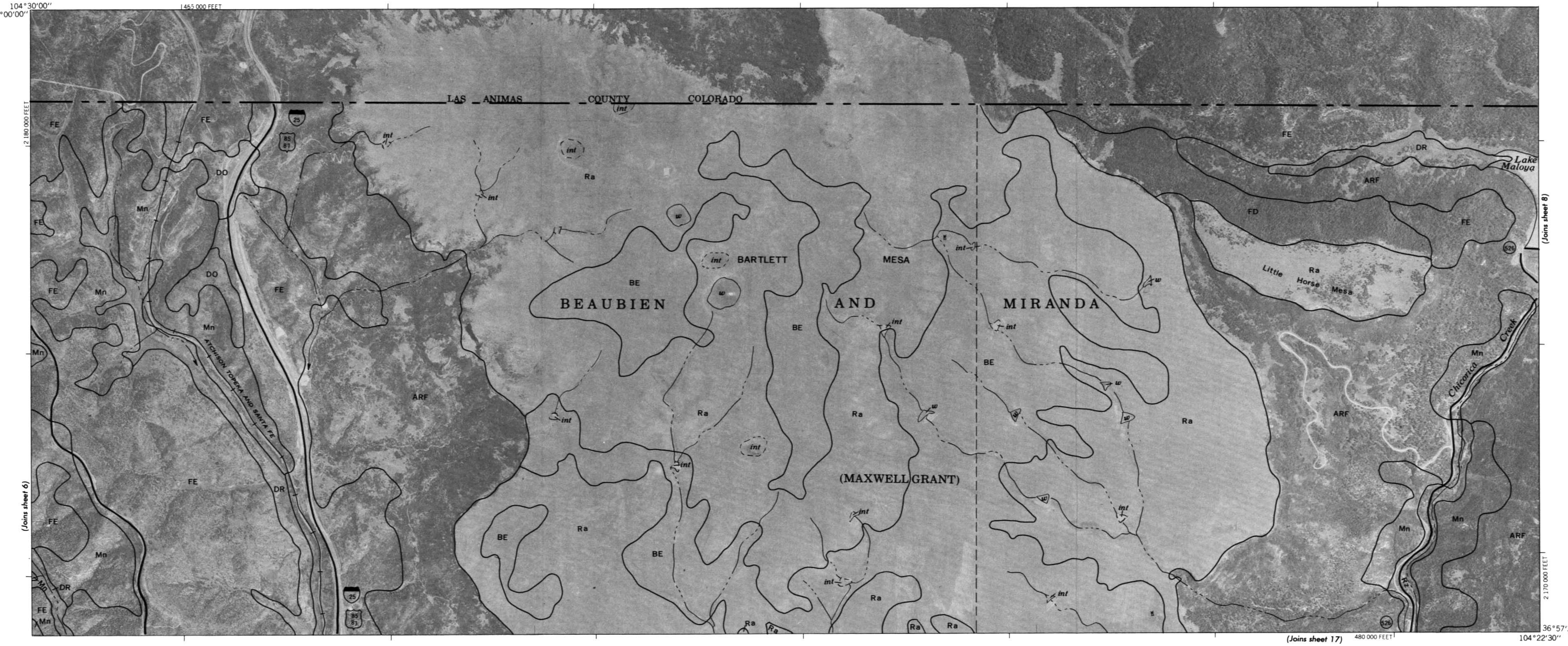
7

N



1 ¾ ½ ¼ 0 1 2 Miles

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COLFAX COUNTY, NEW MEXICO NO. 7

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SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 8

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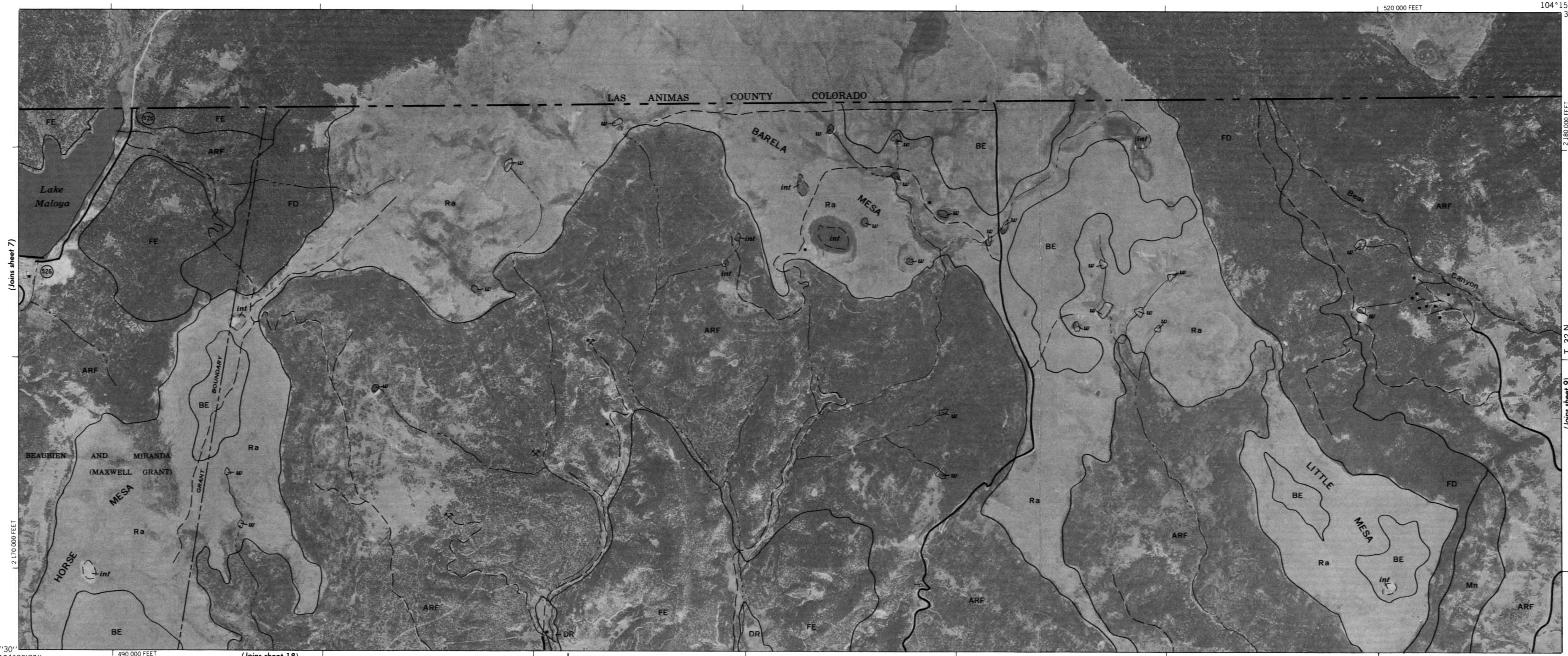

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9

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COLFAX COUNTY, NEW MEXICO NO. 9

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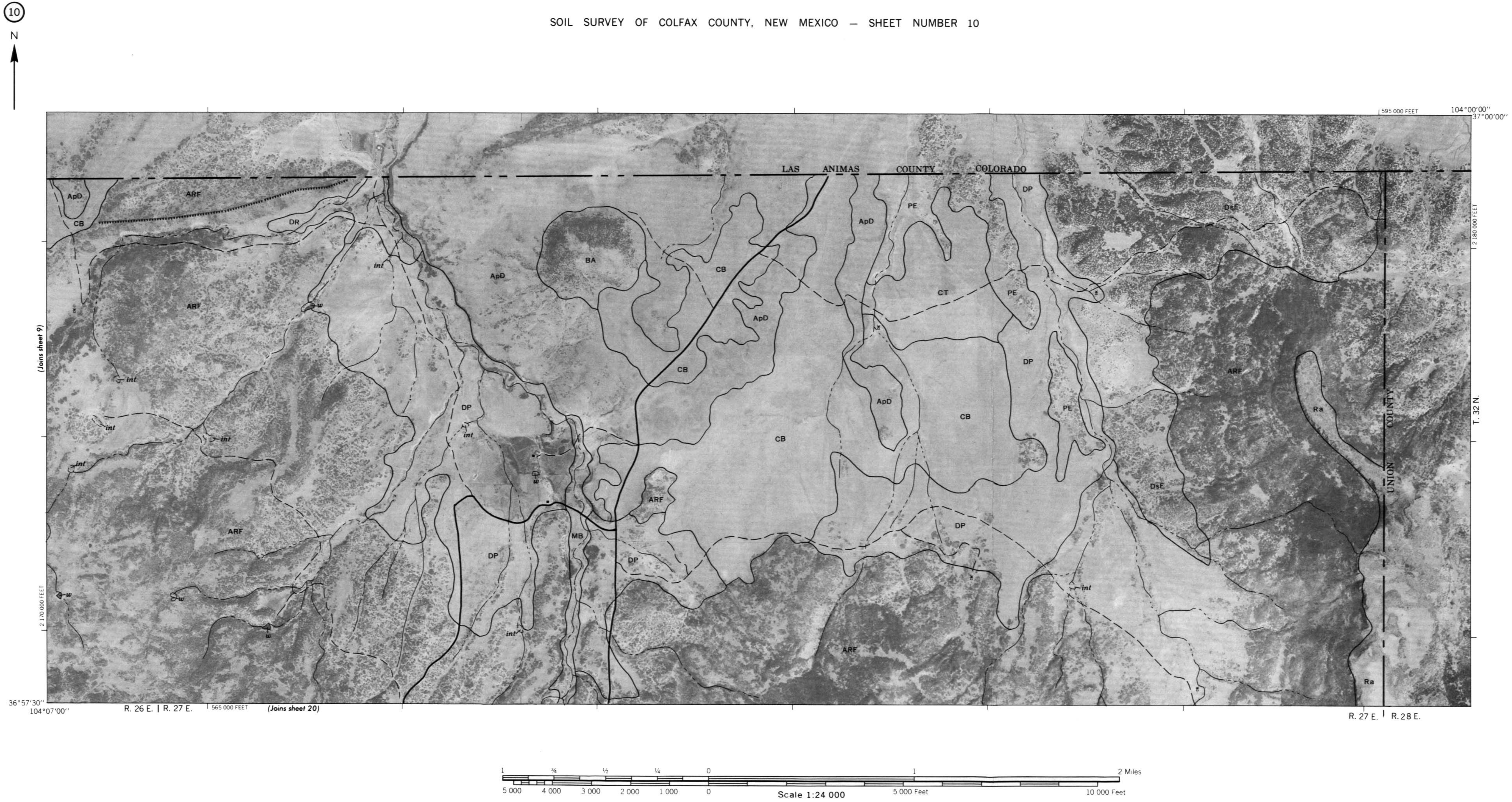
Scale 1:24 000



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Scale 1:24 000

12

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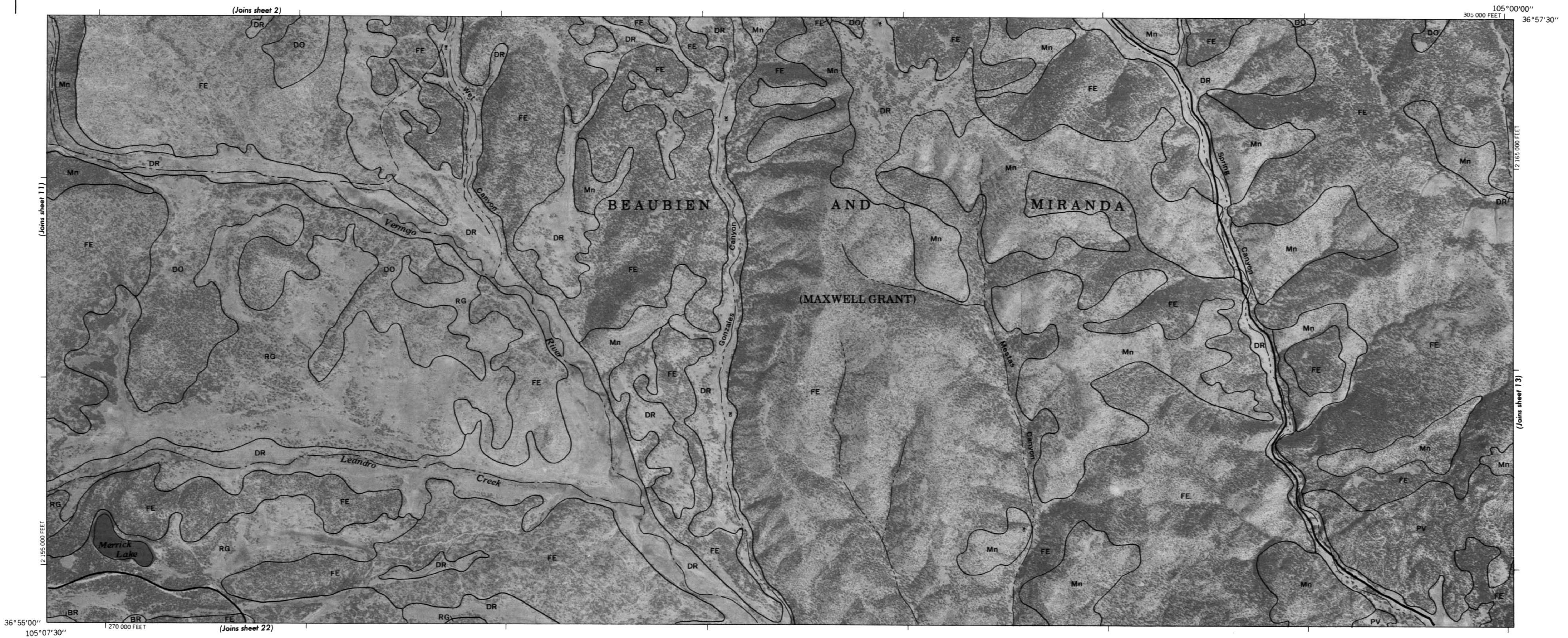
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 12



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Scale 1:24 000

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COLFAX COUNTY, NEW MEXICO NO. 12

13

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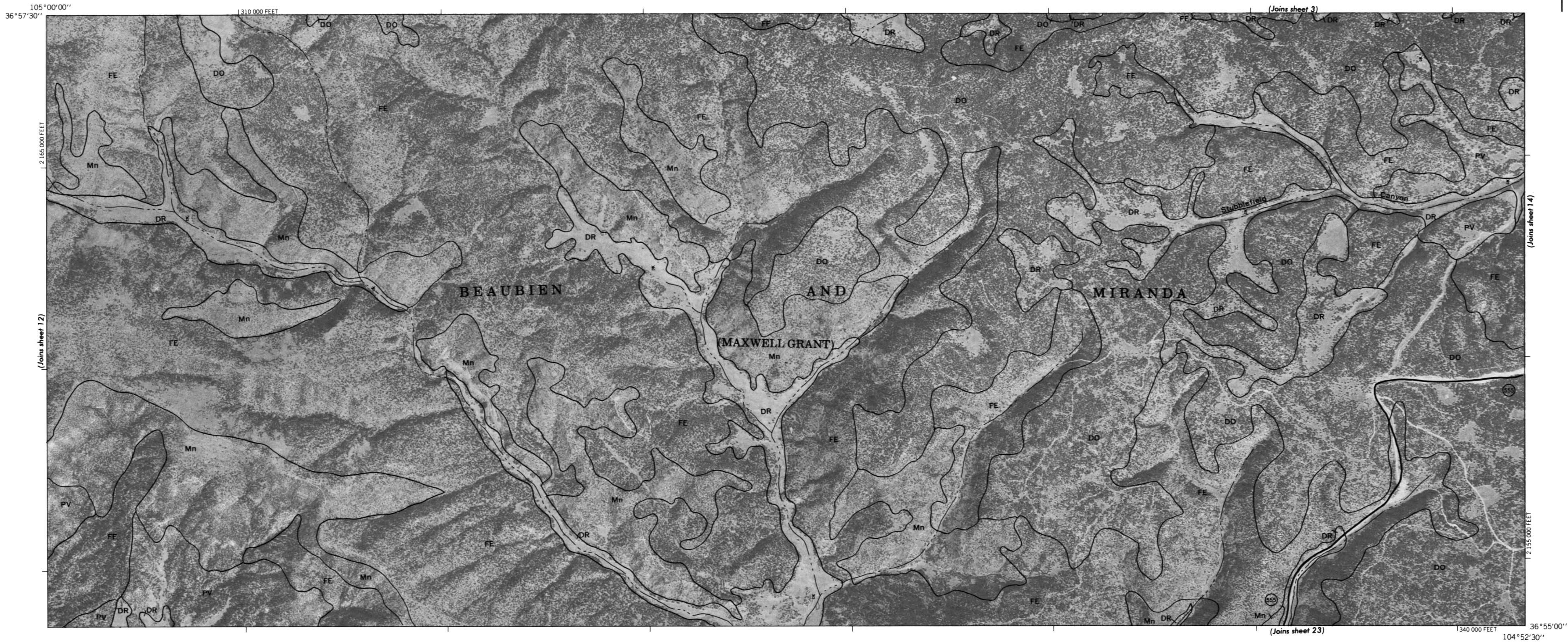

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Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 13

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SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 14

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15

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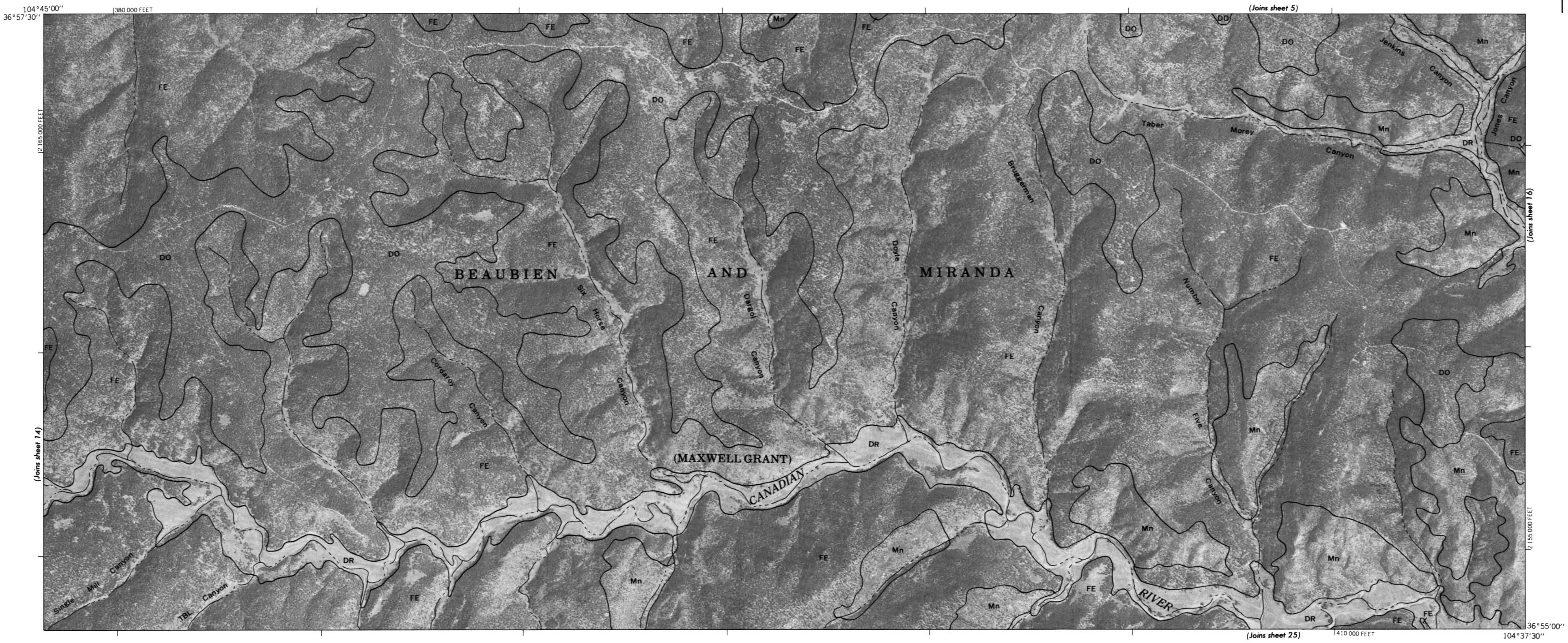

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 15

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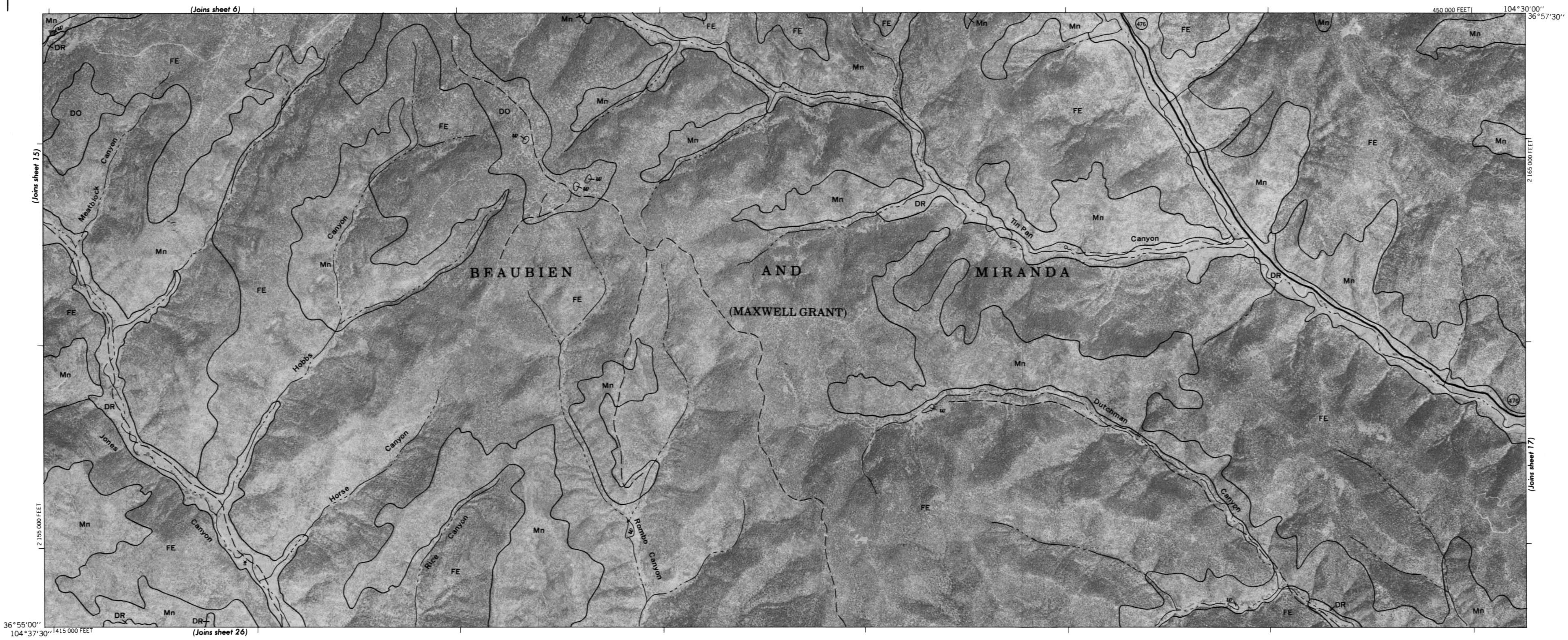
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 16

N



1 ¾ ½ ¼ 0 1 2 Miles

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Scale 1:24 000

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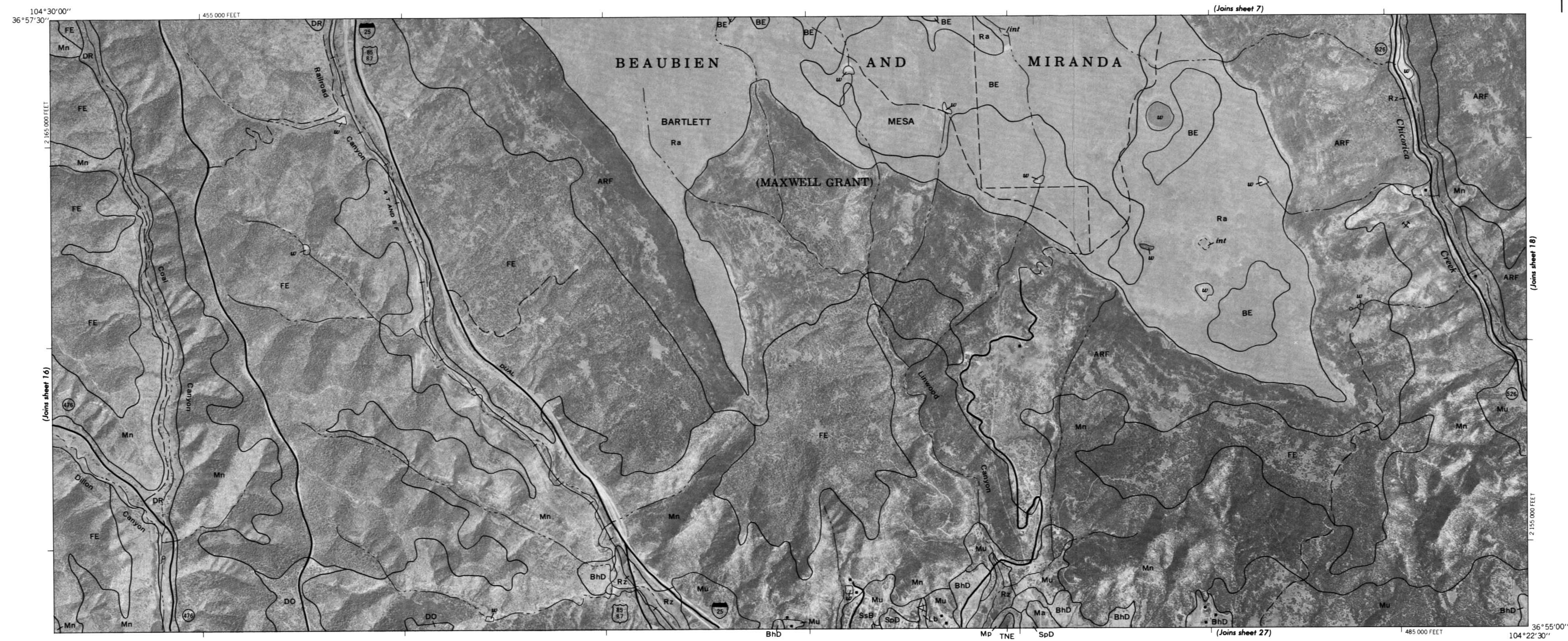

COLFAX COUNTY, NEW MEXICO NO. 17

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1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 18

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N

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 19

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SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 20

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COLFAX COUNTY, NEW MEXICO NO. 20

COLFAX COUNTY, NEW MEXICO NO. 21

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COLFAX COUNTY, NEW MEXICO NO. 22

23

N

COLFAX COUNTY, NEW MEXICO NO. 23

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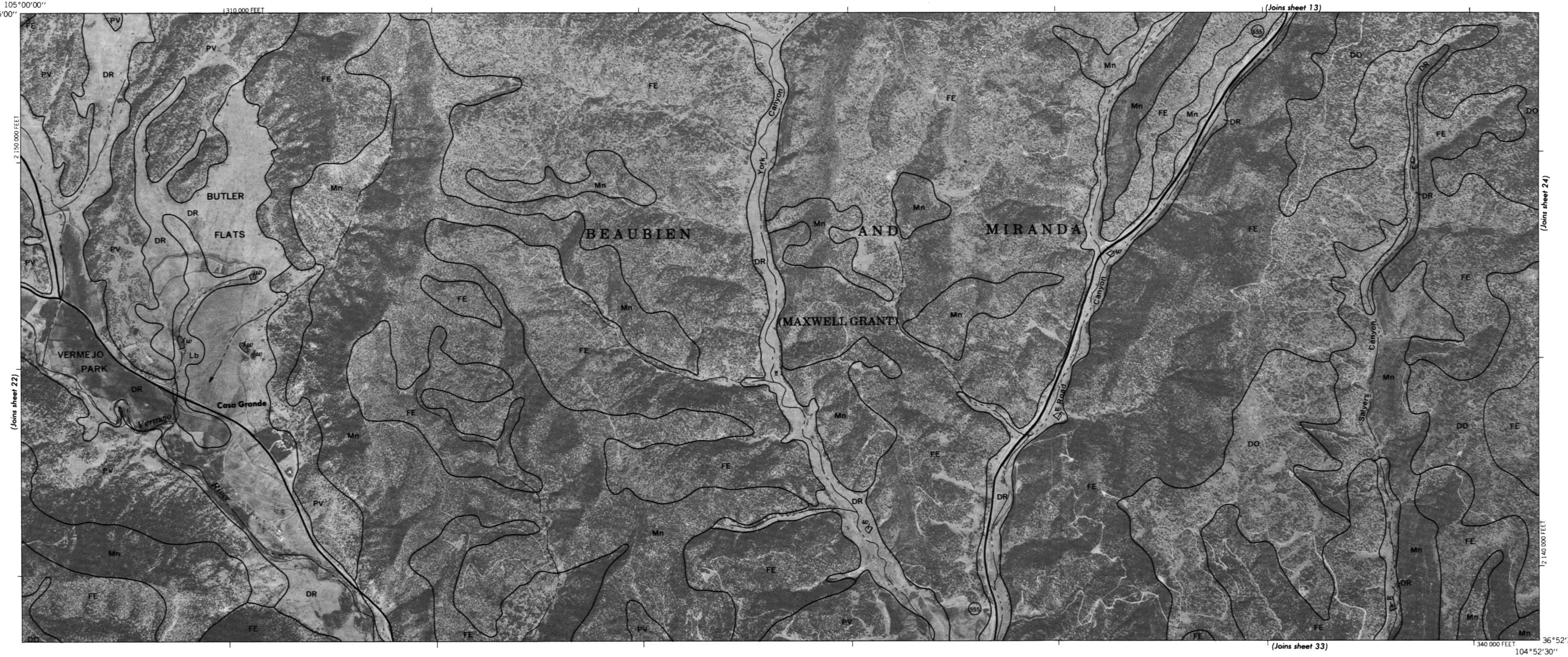

1 ¾ ½ ¼ 0 1 2 Miles

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Scale 1:24 000

(24)

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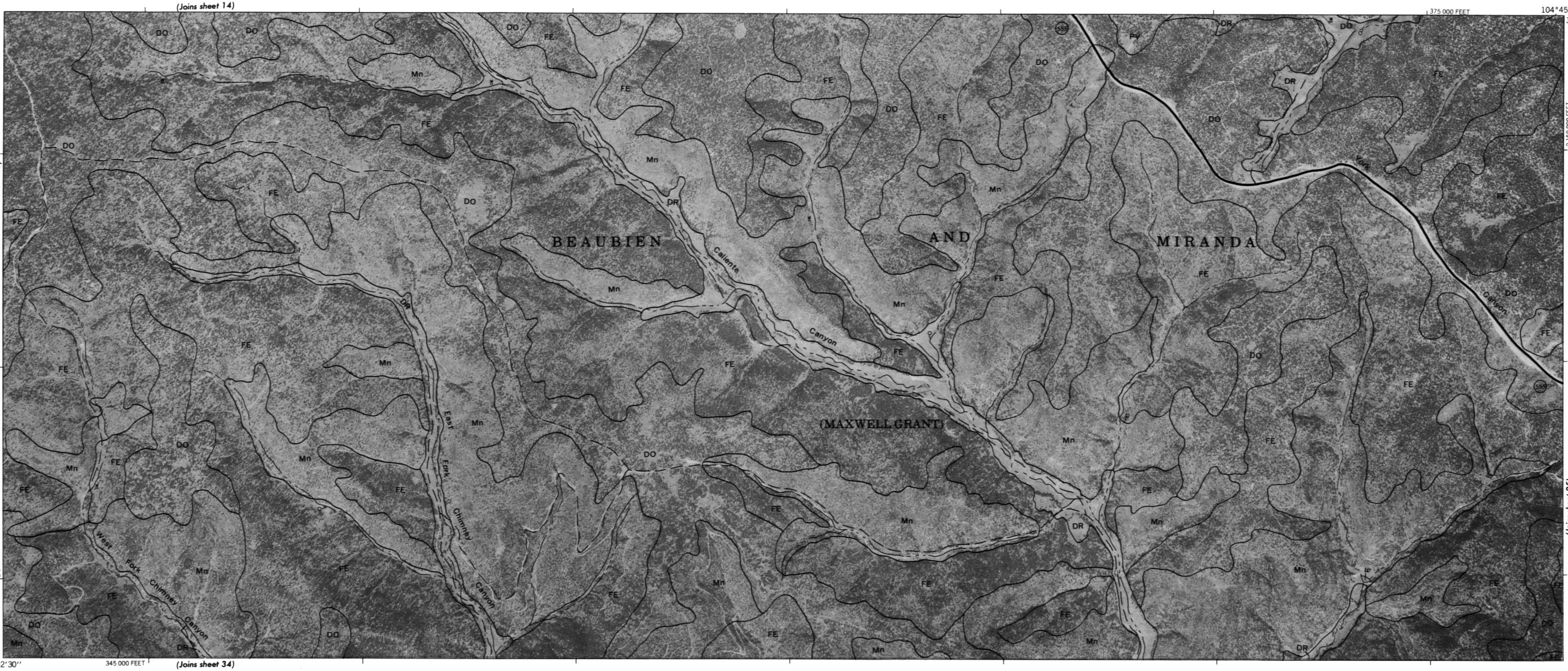


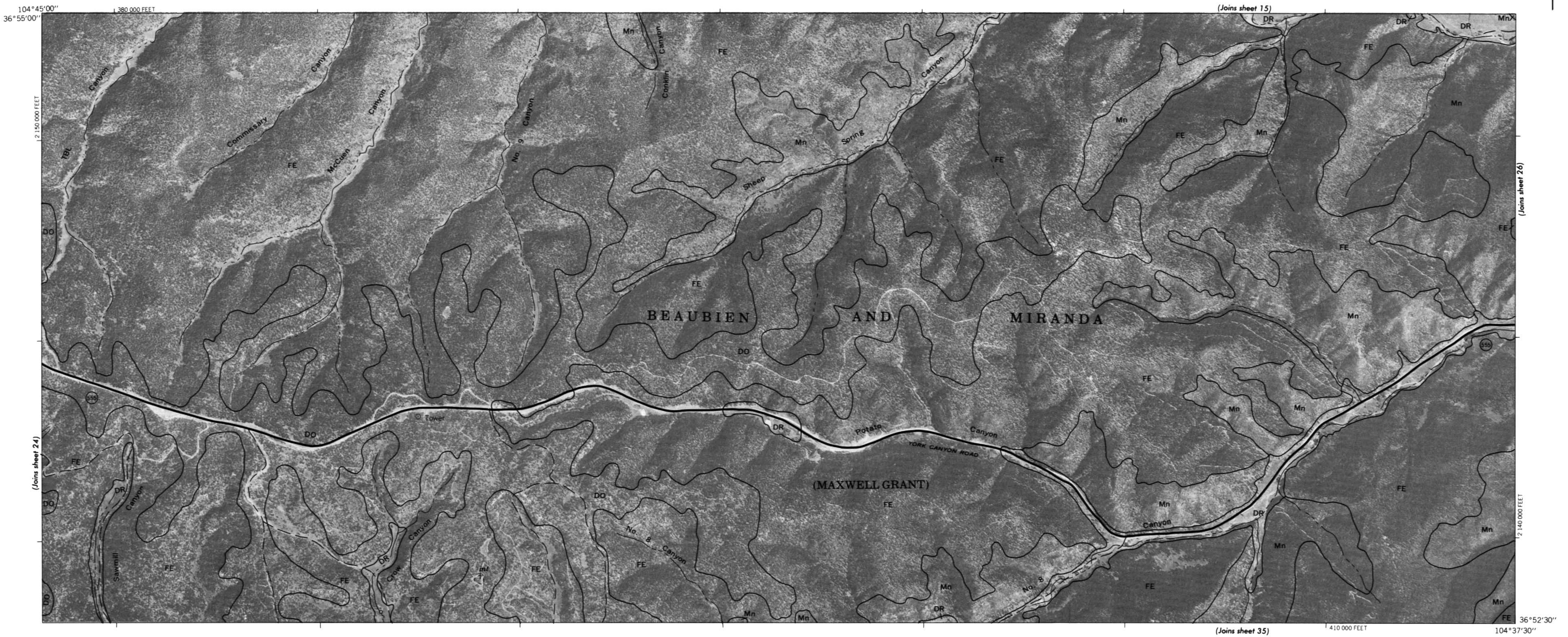
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

COLFAX COUNTY, NEW MEXICO NO. 24



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 25

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 26

27

N

COLFAX COUNTY, NEW MEXICO NO. 27

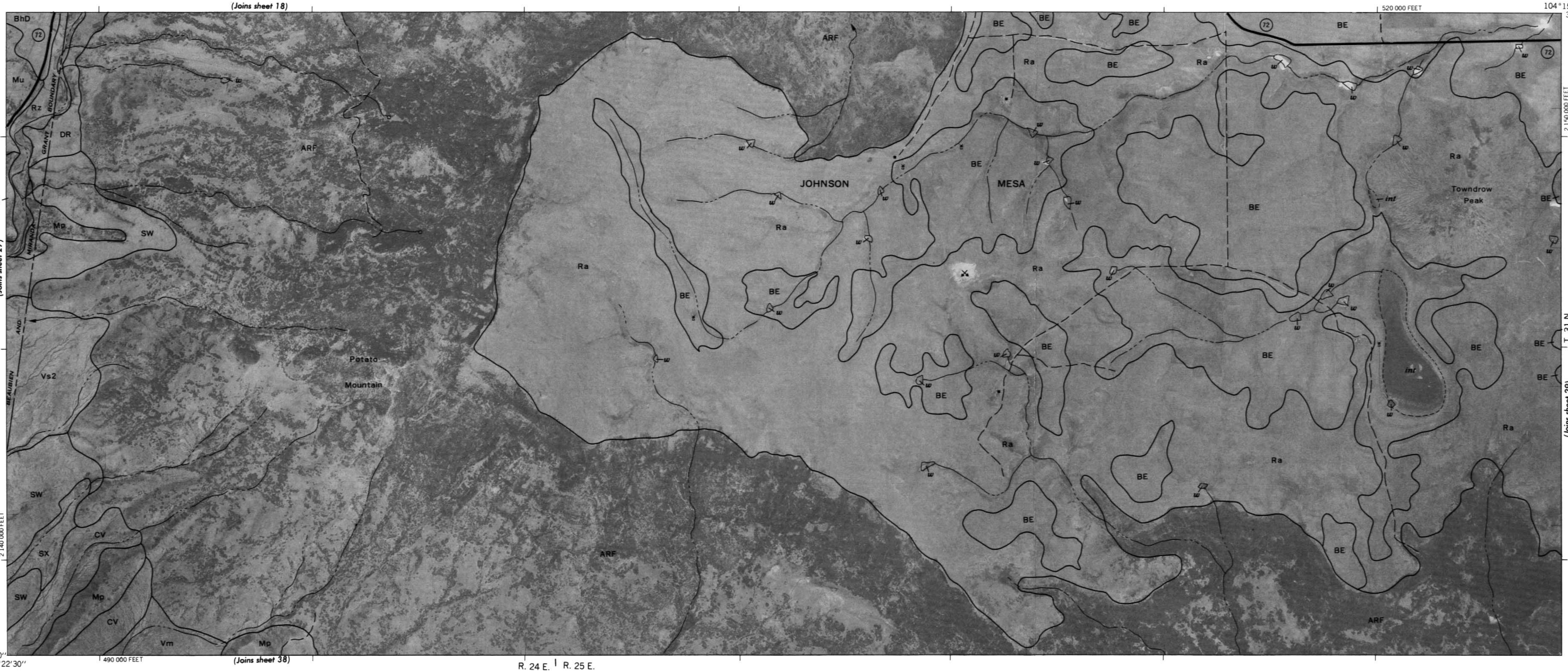
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N



1	¾	½	¼	0	1	2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

104°15′00″ 36°55′00″ 525 000 FEET R. 25 E. | R. 26 E. (Joins sheet 19)

(Joins sheet 39) 560 000 FEET 36°52′30″ 104°07′30″

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 29

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 30

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

31

N

COLFAX COUNTY, NEW MEXICO NO. 31

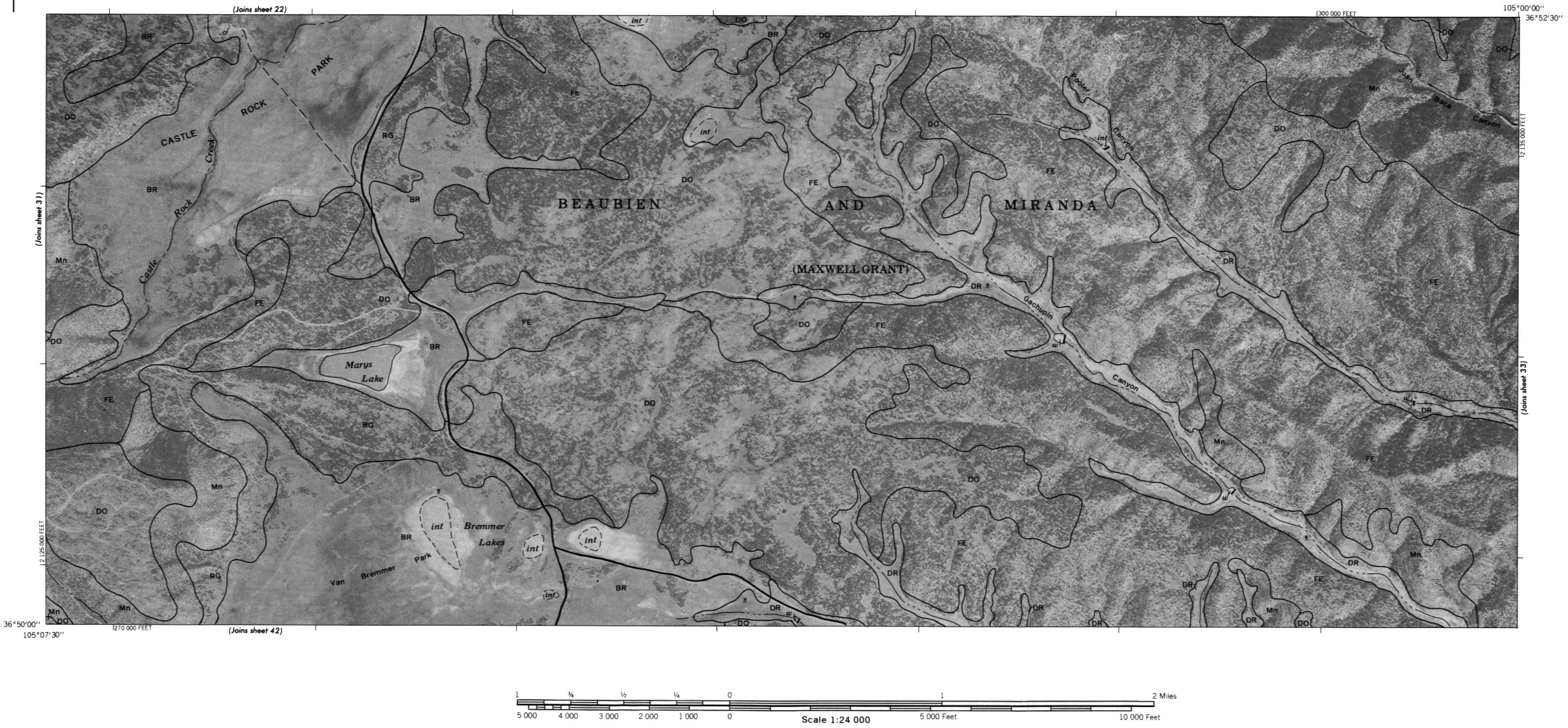
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 32

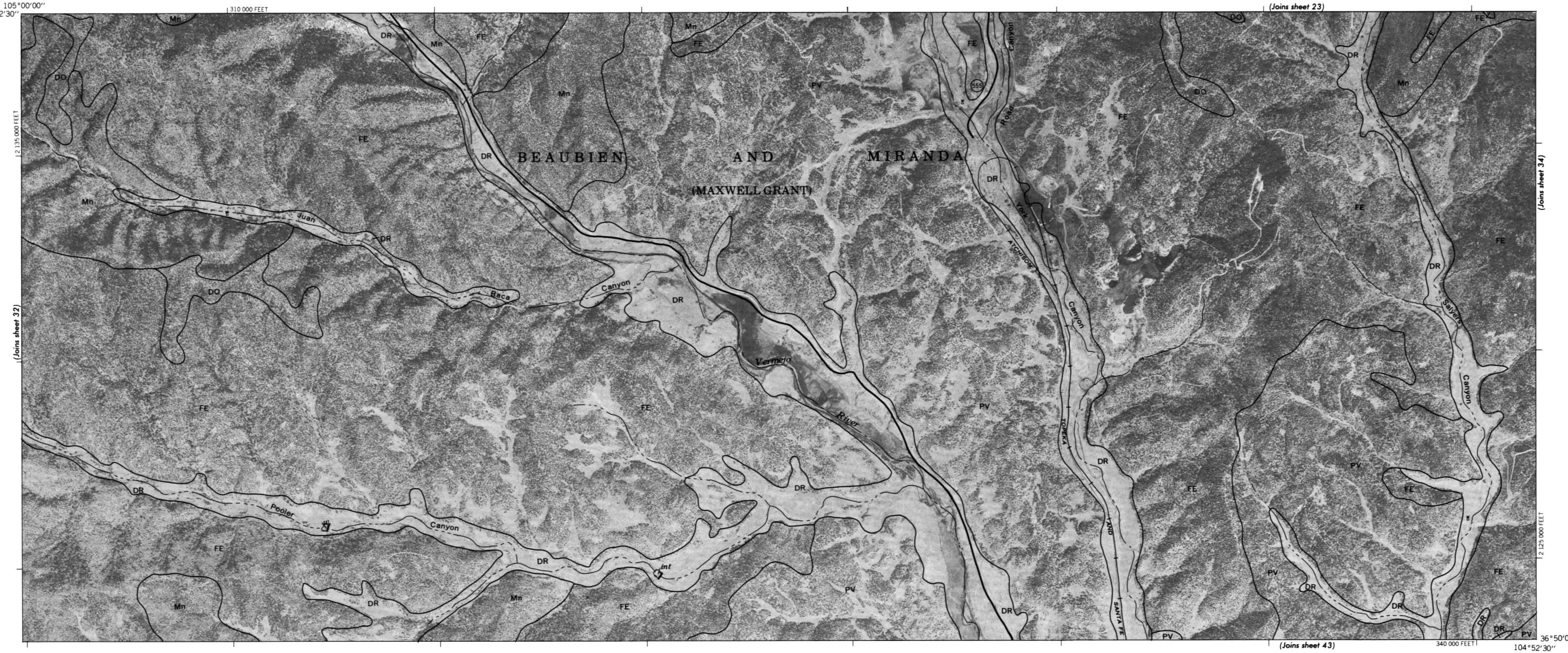


Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 32

33

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

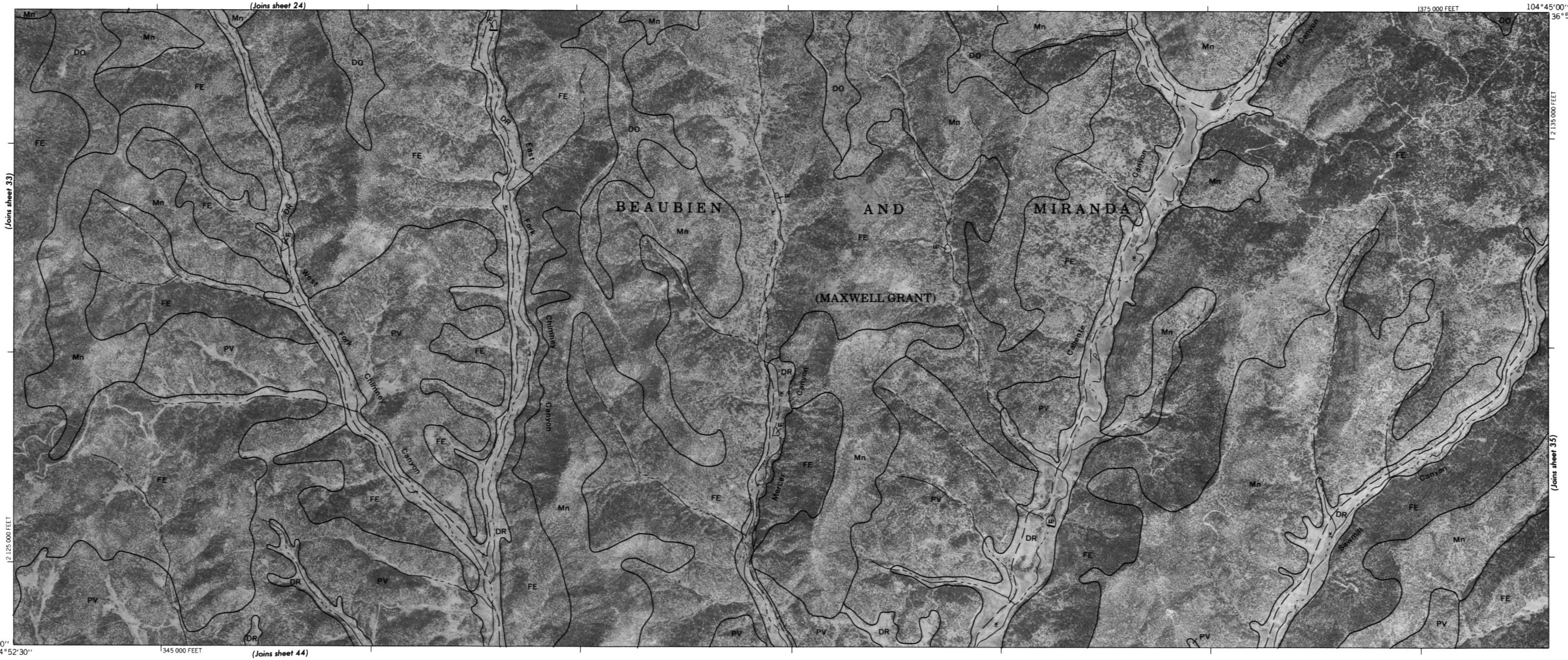
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 33

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 34

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

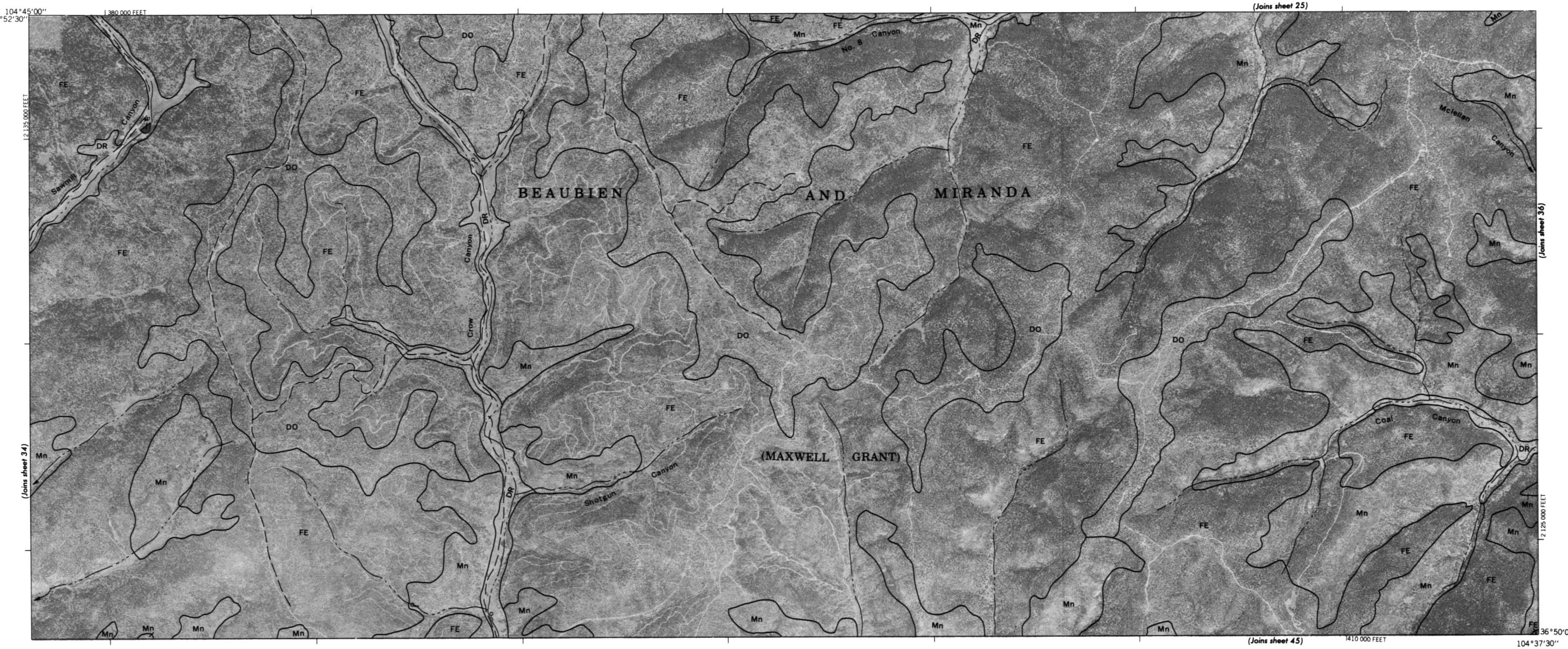
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

35

N

COLFAX COUNTY, NEW MEXICO NO. 35

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

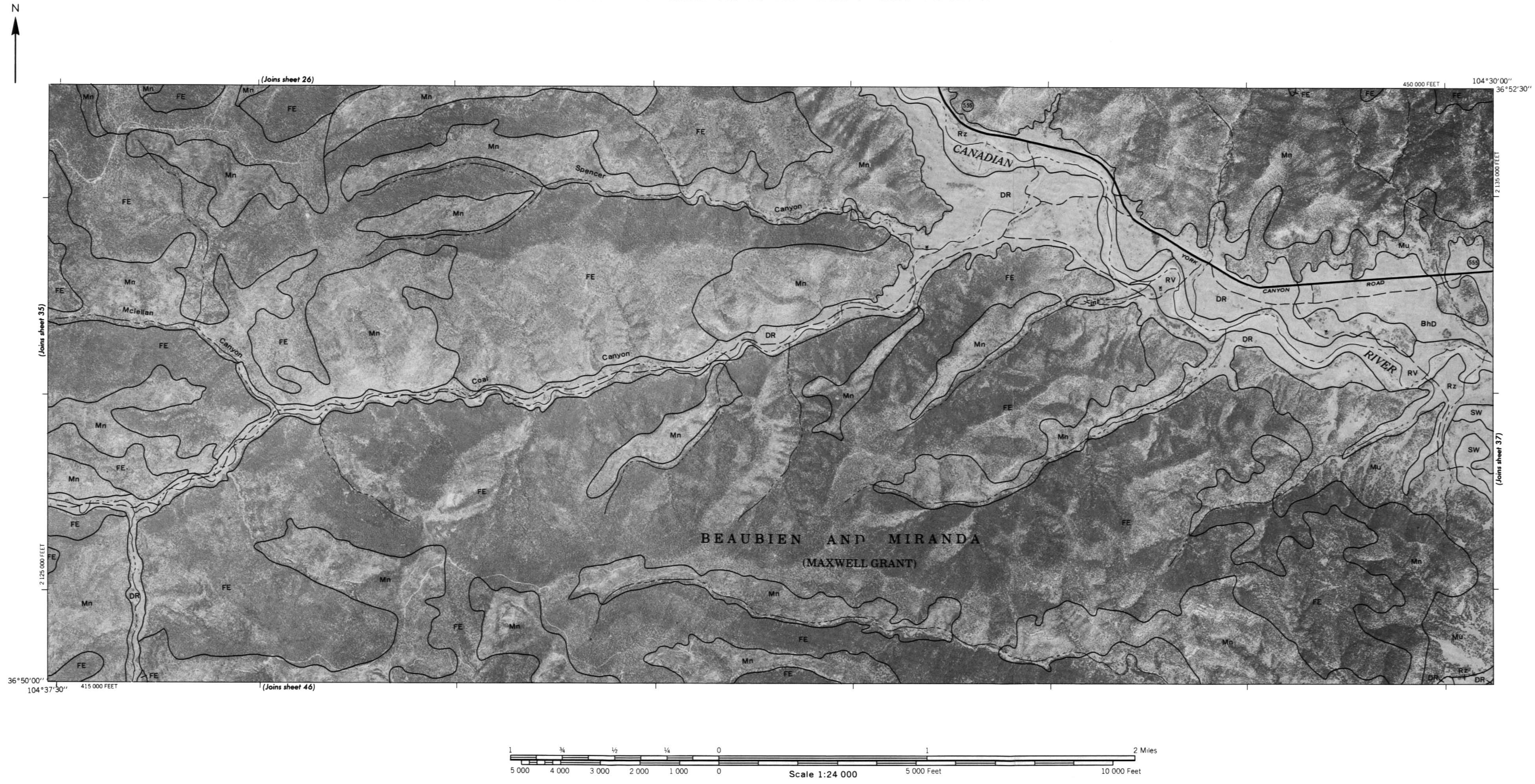


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 36



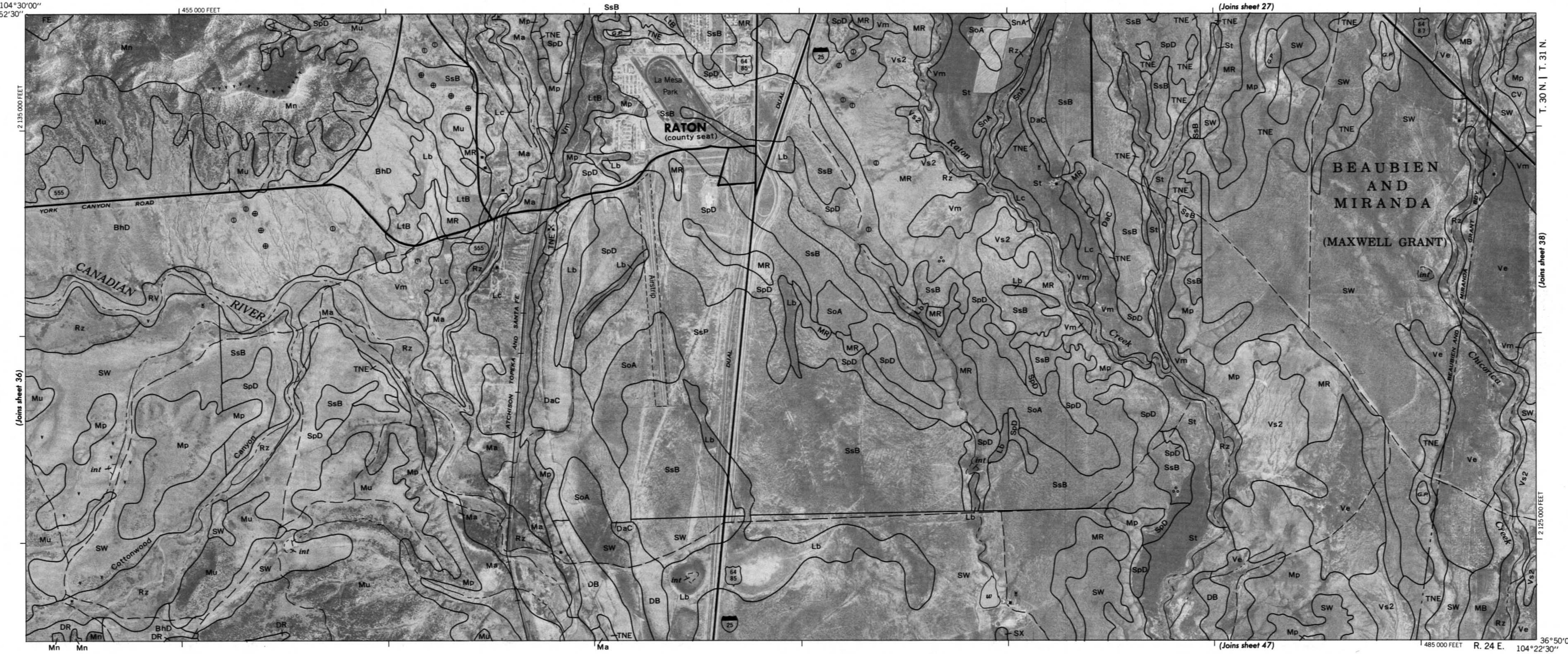
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

37

N

COLFAX COUNTY, NEW MEXICO NO. 37

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

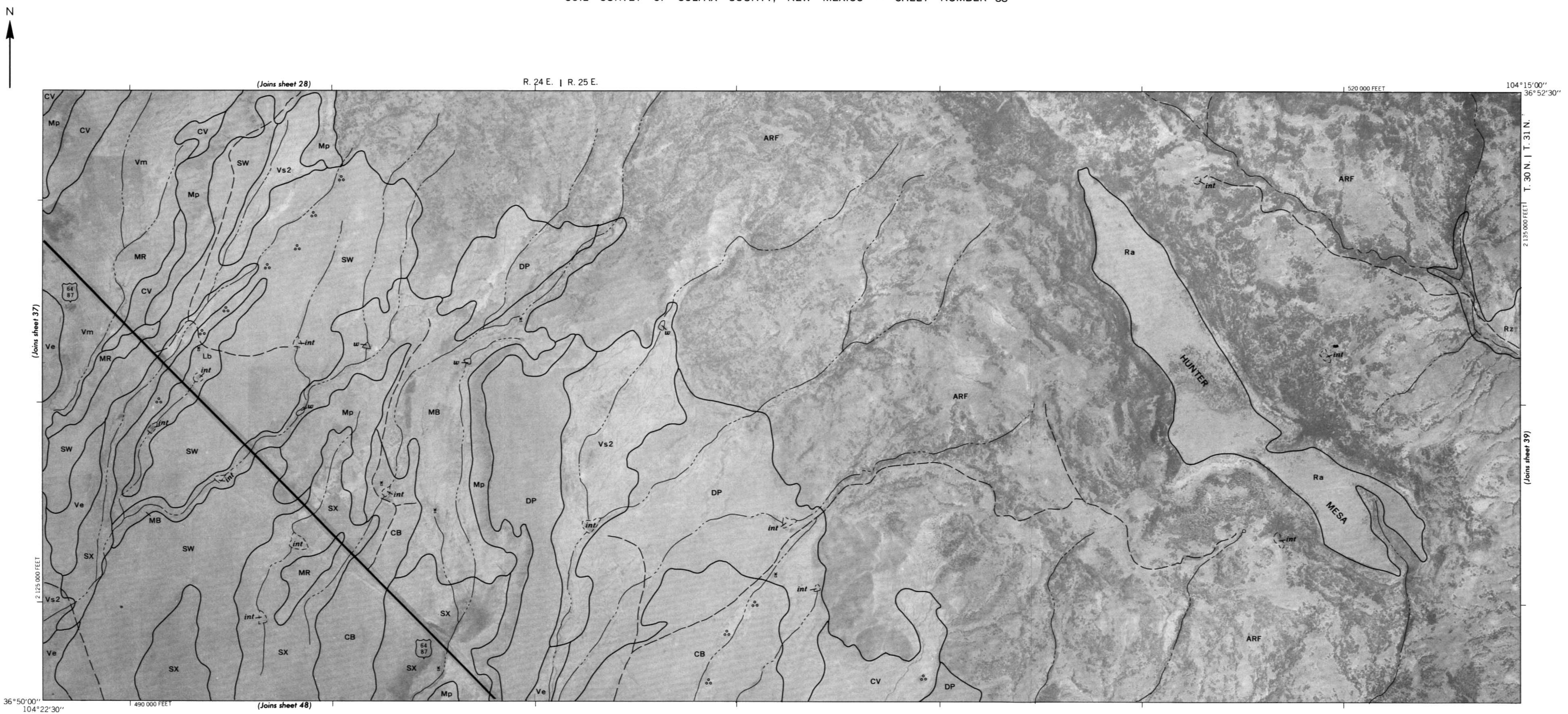


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

(38)



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

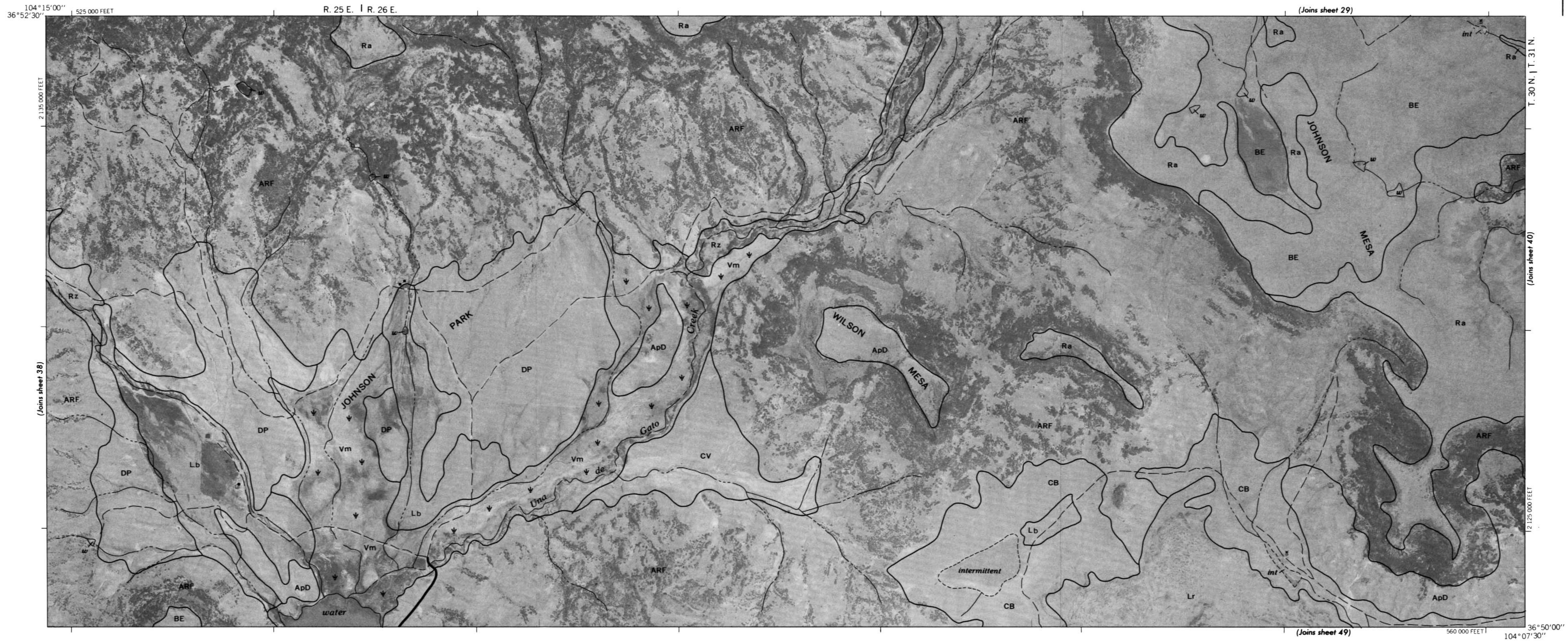
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

39

N

COLFAX COUNTY, NEW MEXICO NO. 39

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



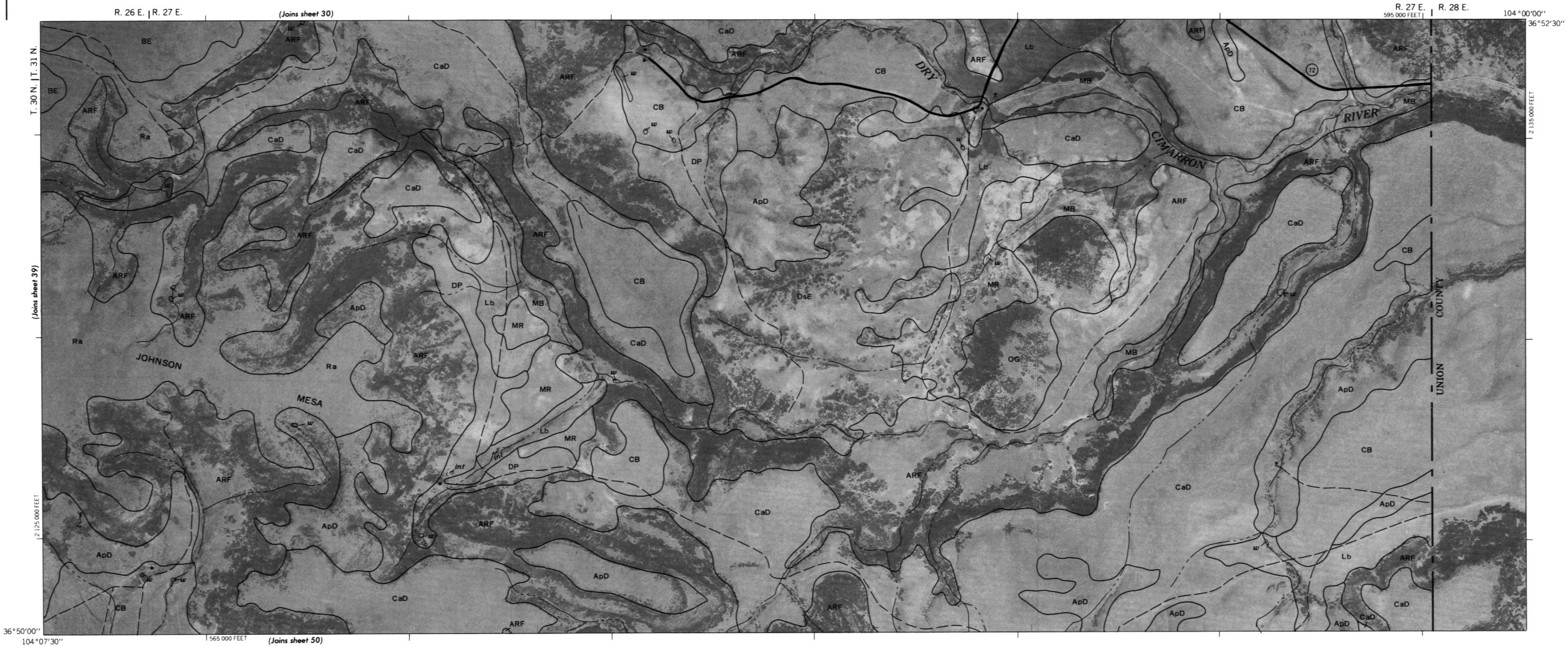
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 40

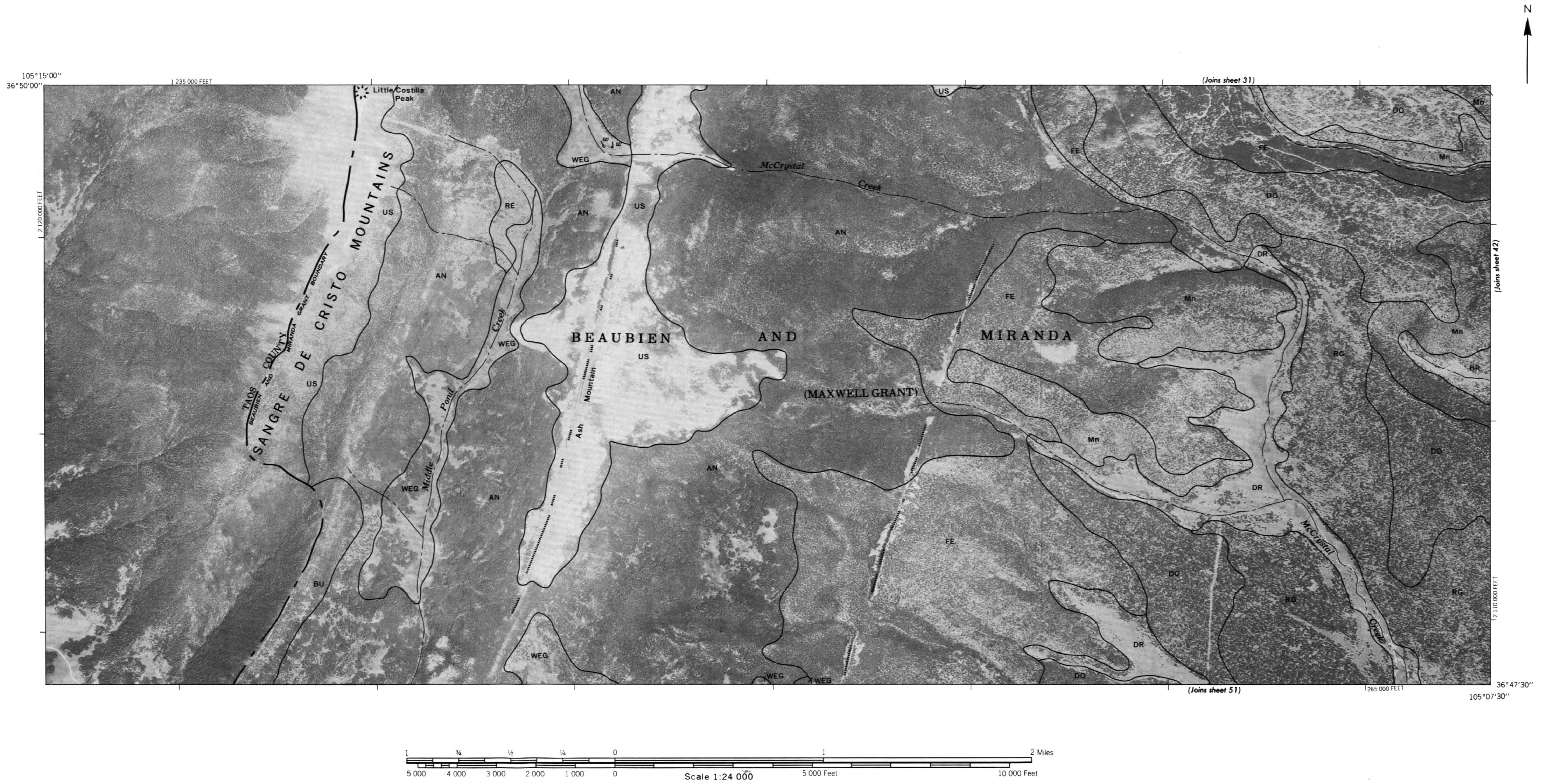


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

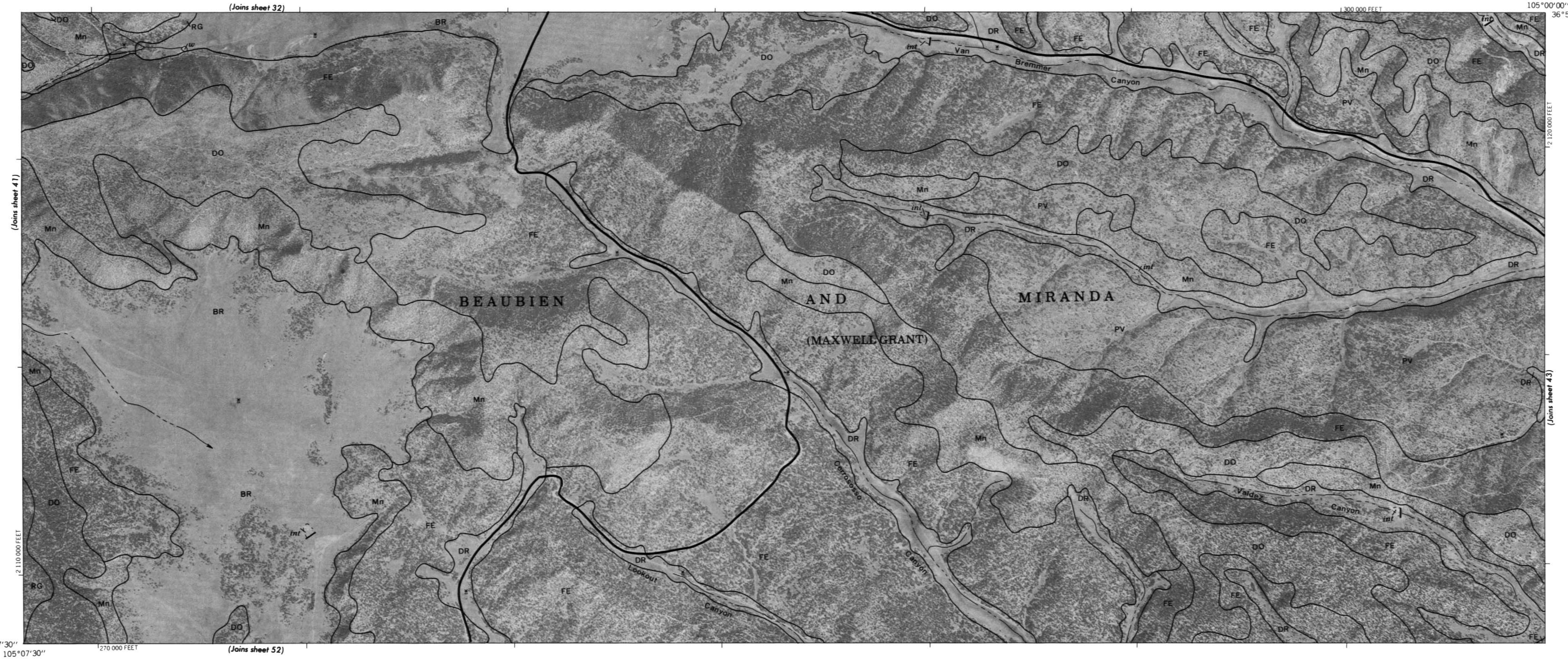


COLFAX COUNTY, NEW MEXICO NO. 41

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 42



1 ¾ ½ ¼ 0 1 2 Miles

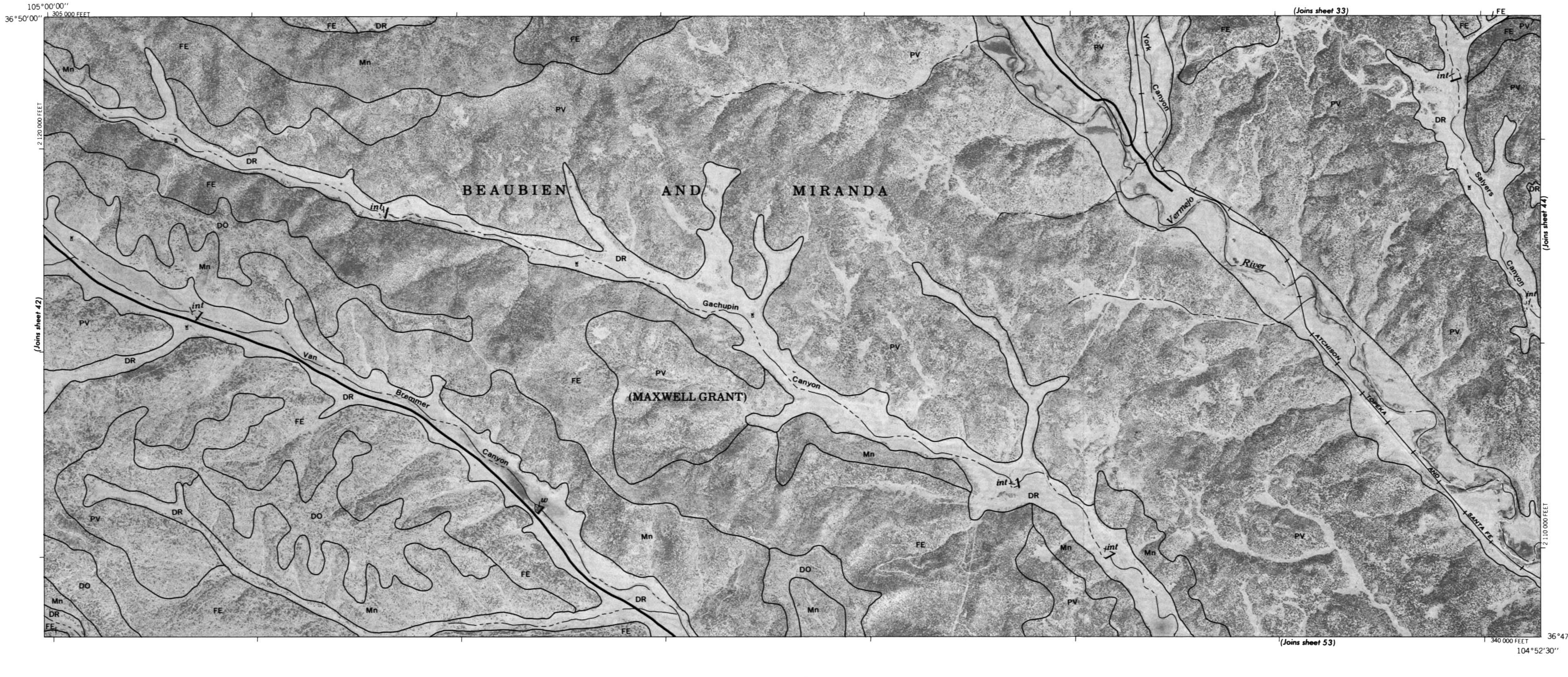
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 43

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



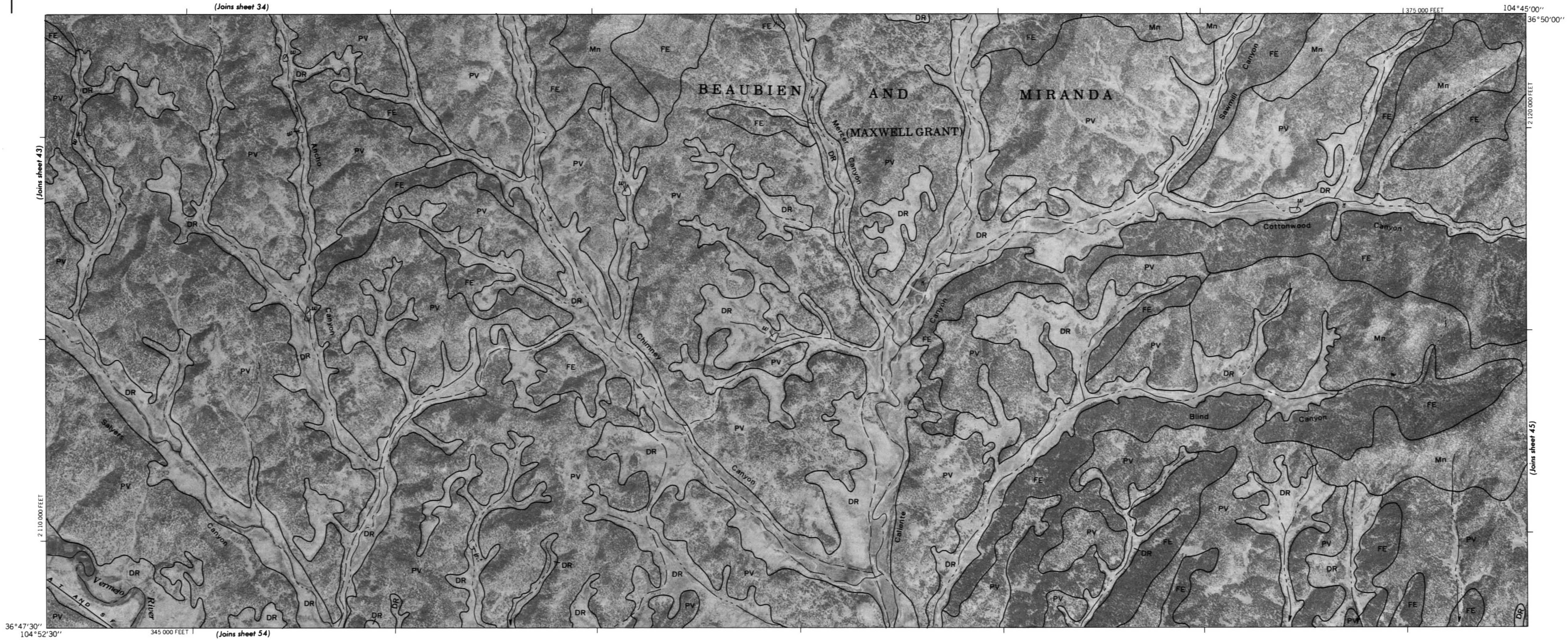
Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 44

N



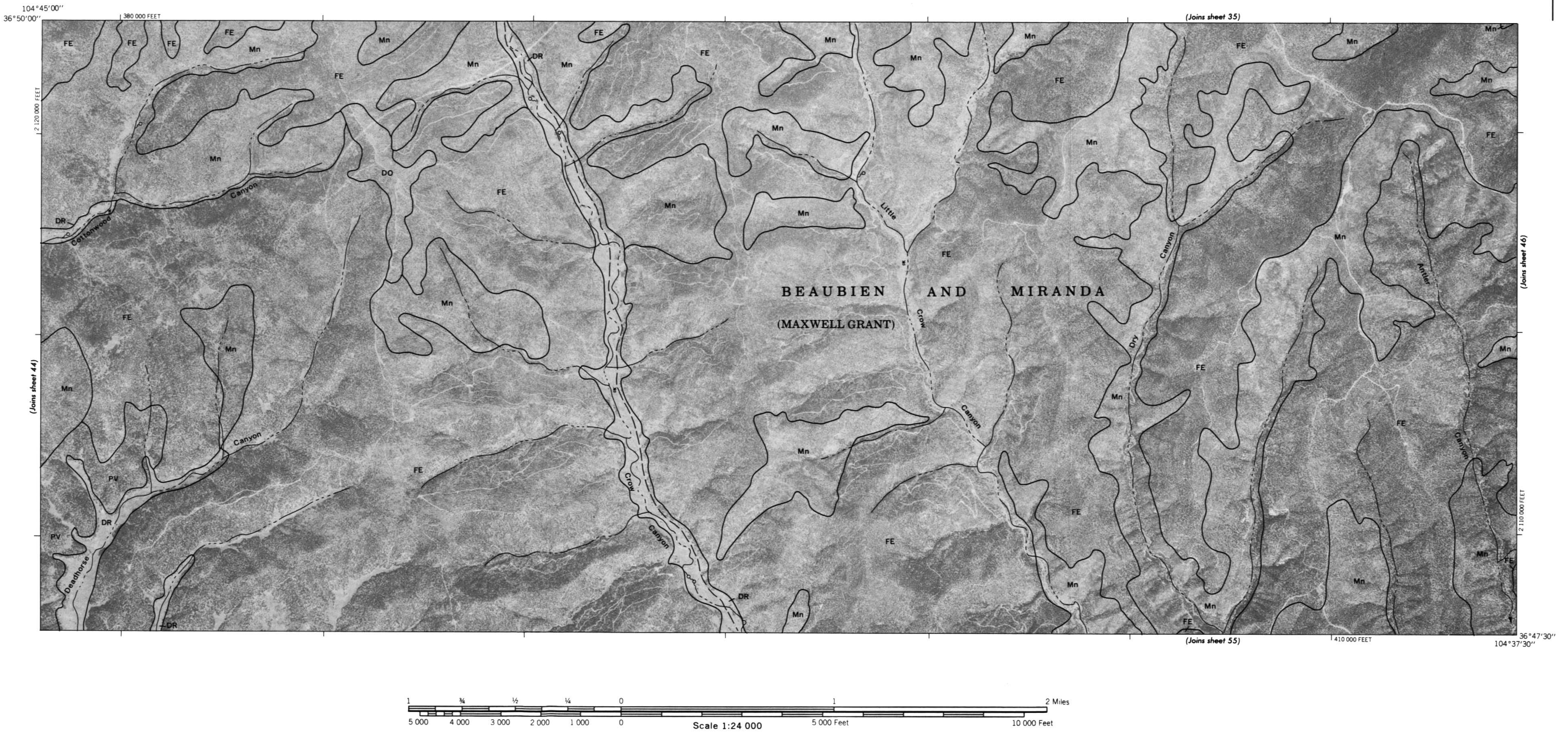
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 44



COLFAX COUNTY, NEW MEXICO NO. 45

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 46

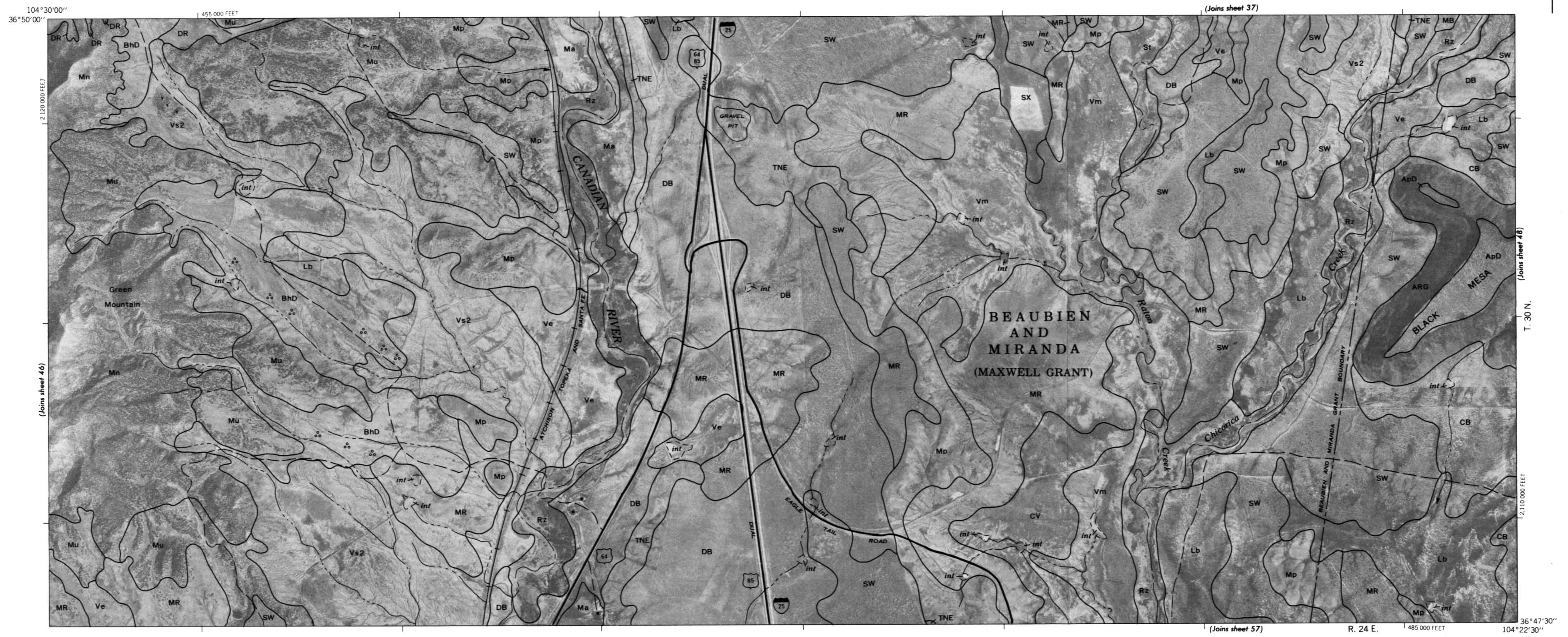
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 46



1 ¾ ½ ¼ 0 1 2 Miles

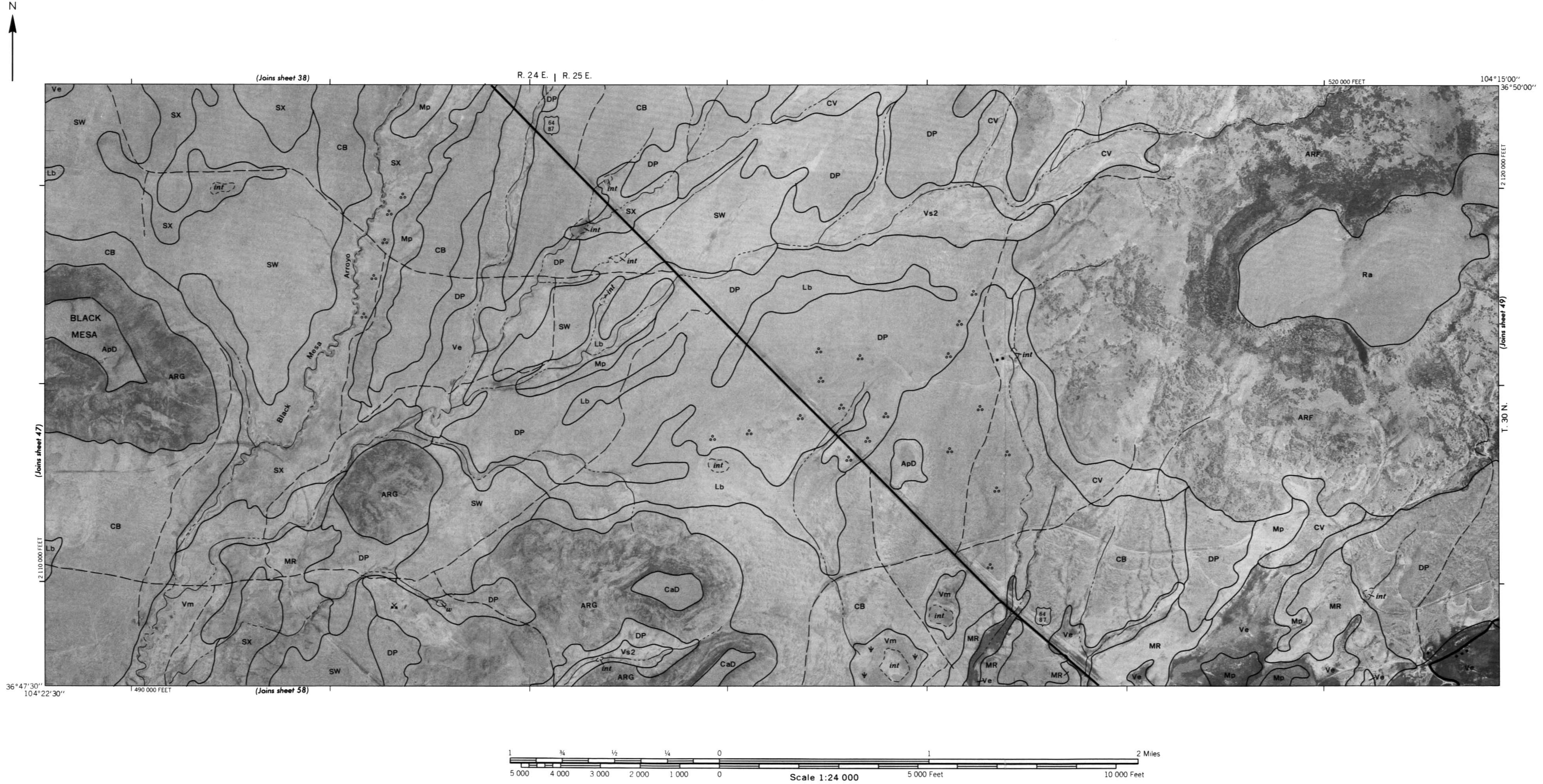
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 47

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 48



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

49

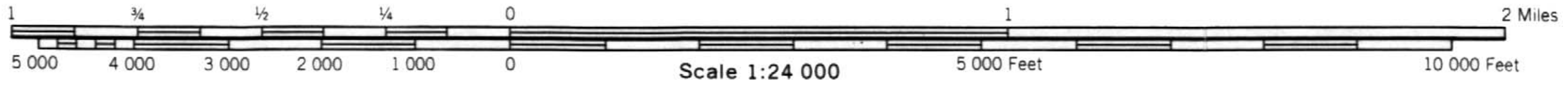
N

COLFAX COUNTY, NEW MEXICO NO. 49

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 50



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 50

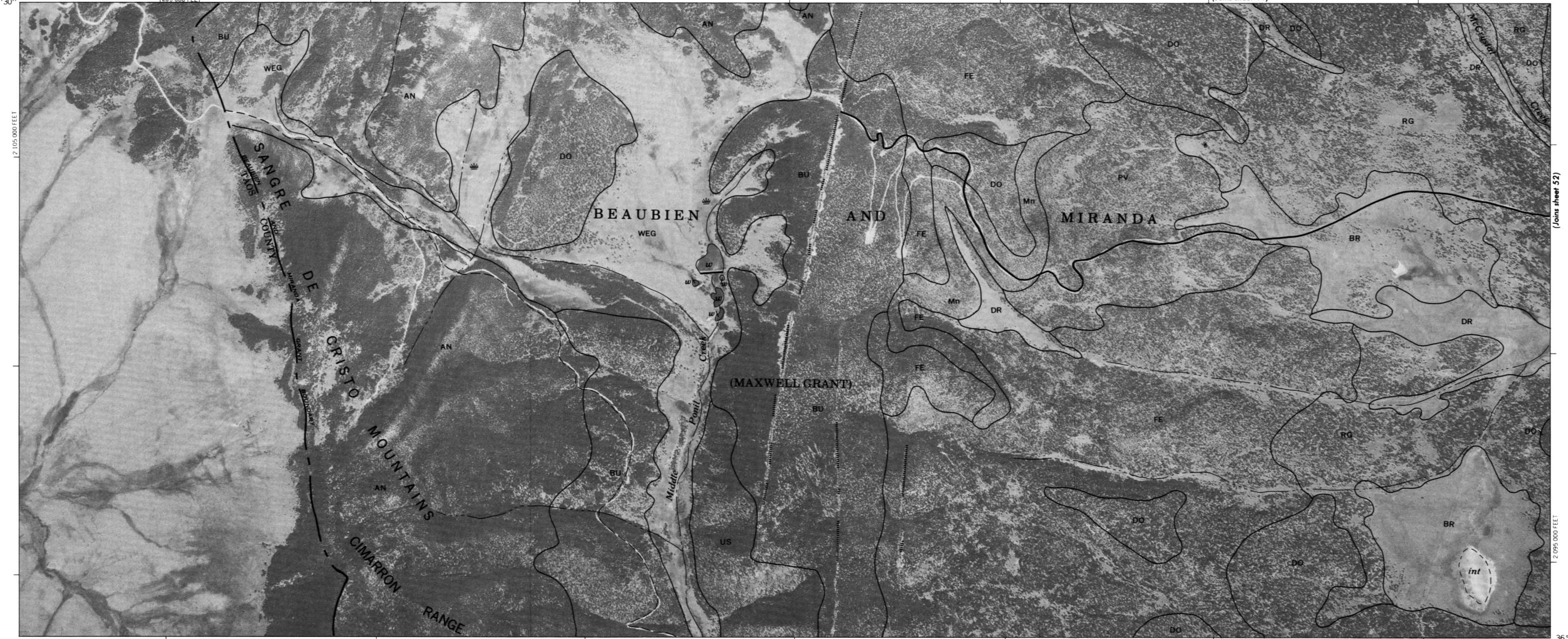
51

N

105°15'00"
36°47'30"

235 000 FEET

(Joins sheet 41)



(Joins sheet 52)

2 105 000 FEET

2 095 000 FEET

(Joins sheet 62)

265 000 FEET

36°45'00"
105°07'30"

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

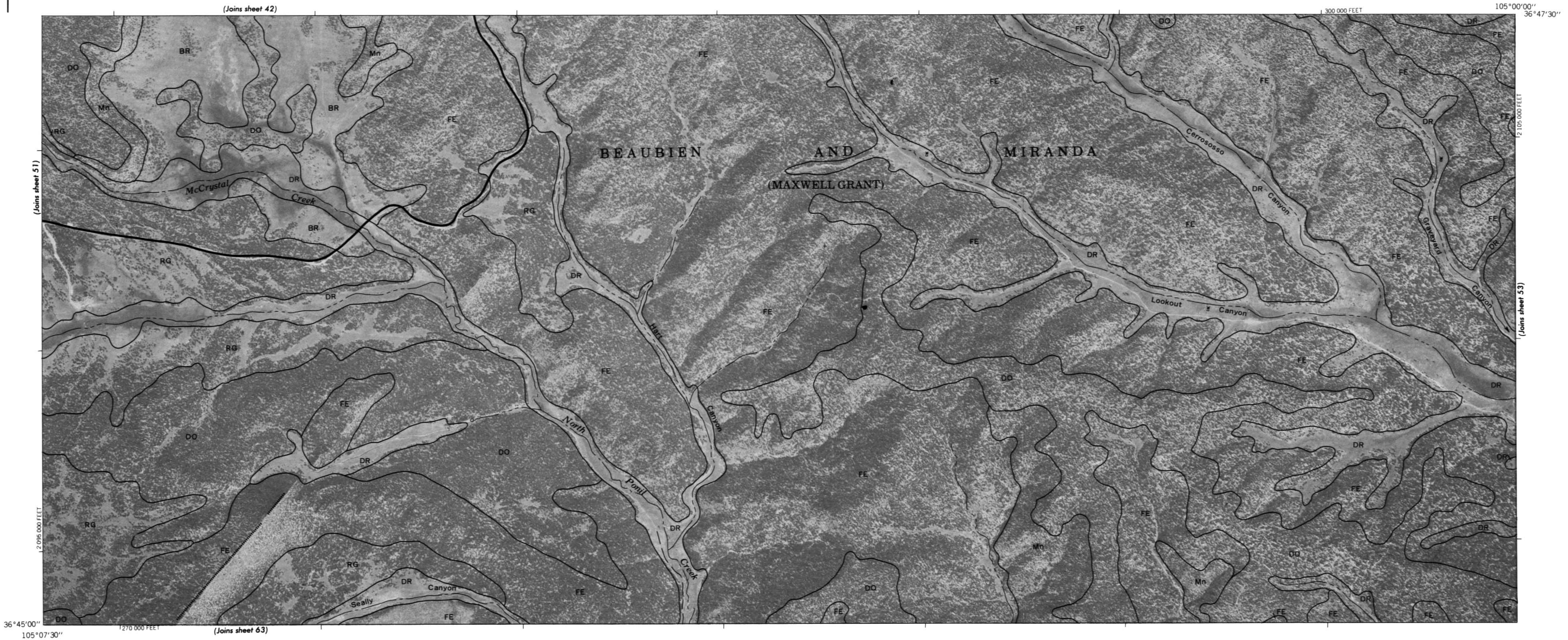
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 51

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 52

N

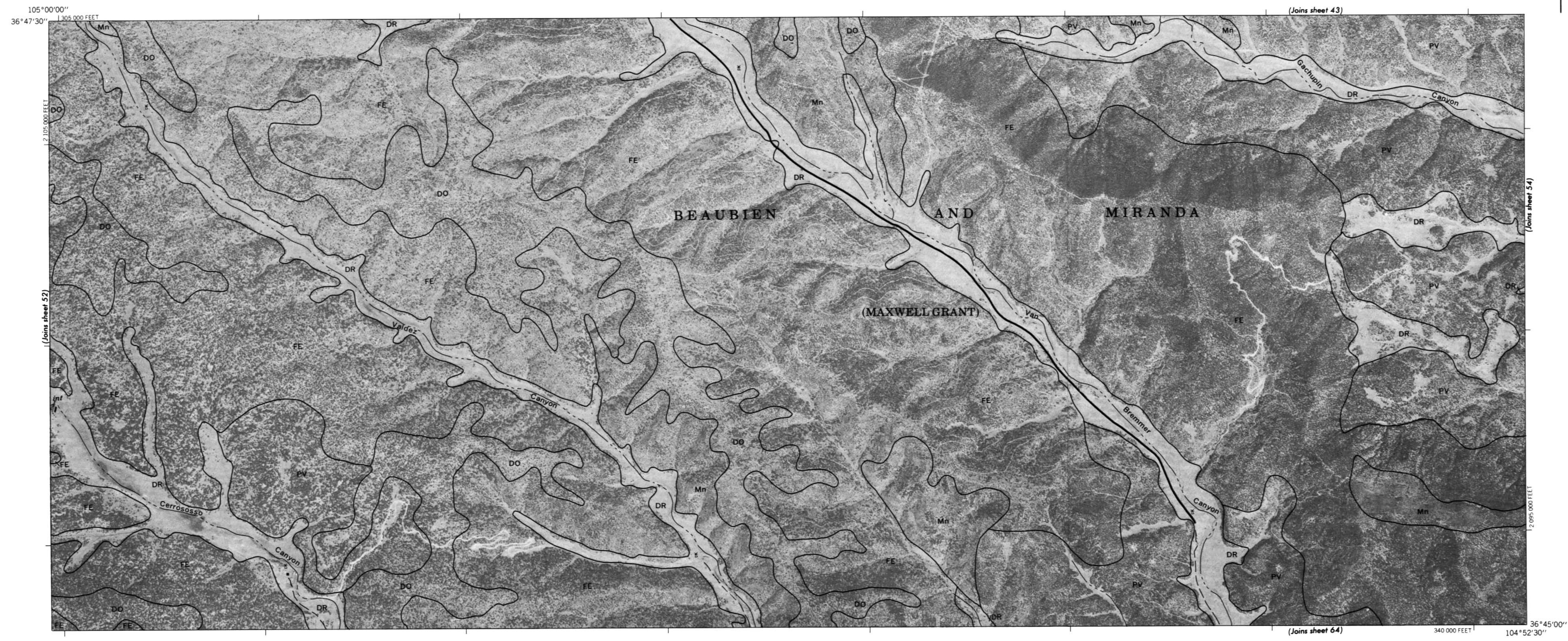


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

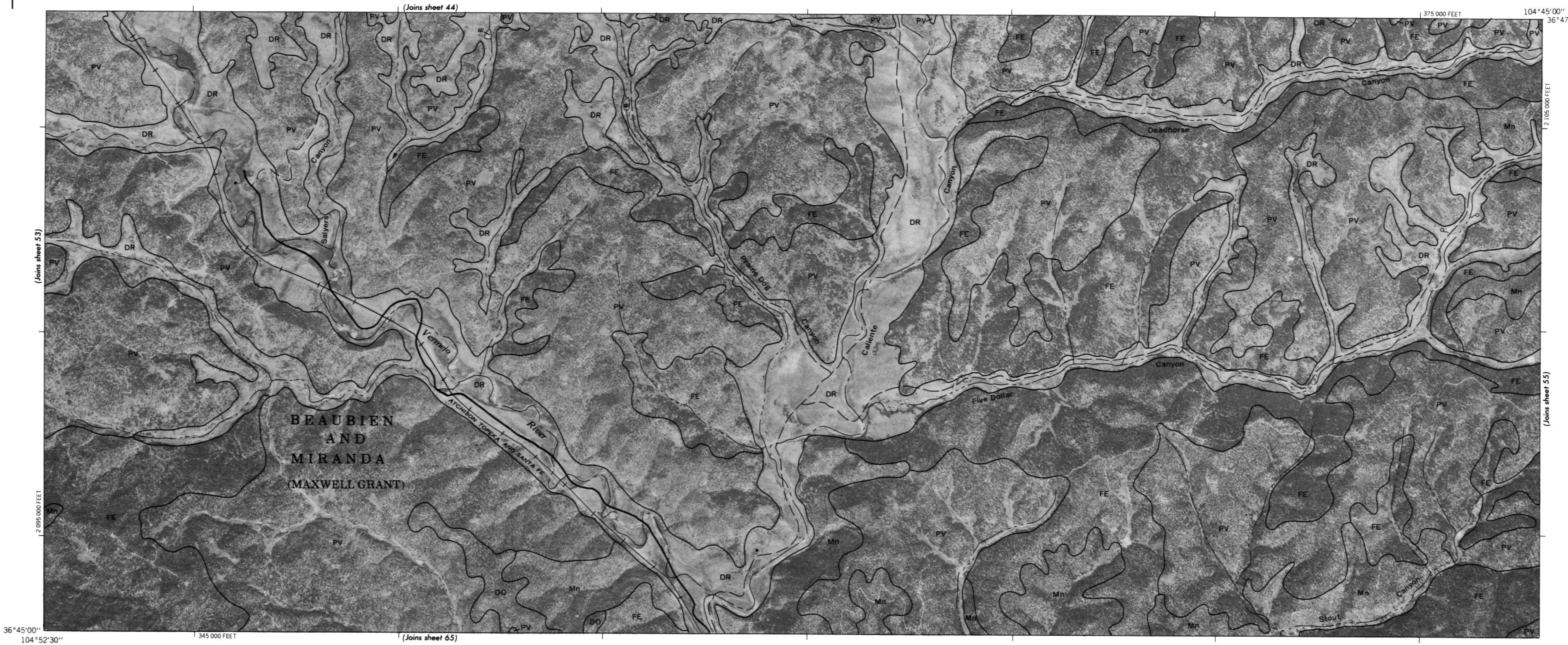
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 53

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 54

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

COLFAX COUNTY, NEW MEXICO NO. 55

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 56

1	¾	½	¼	0	1	2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

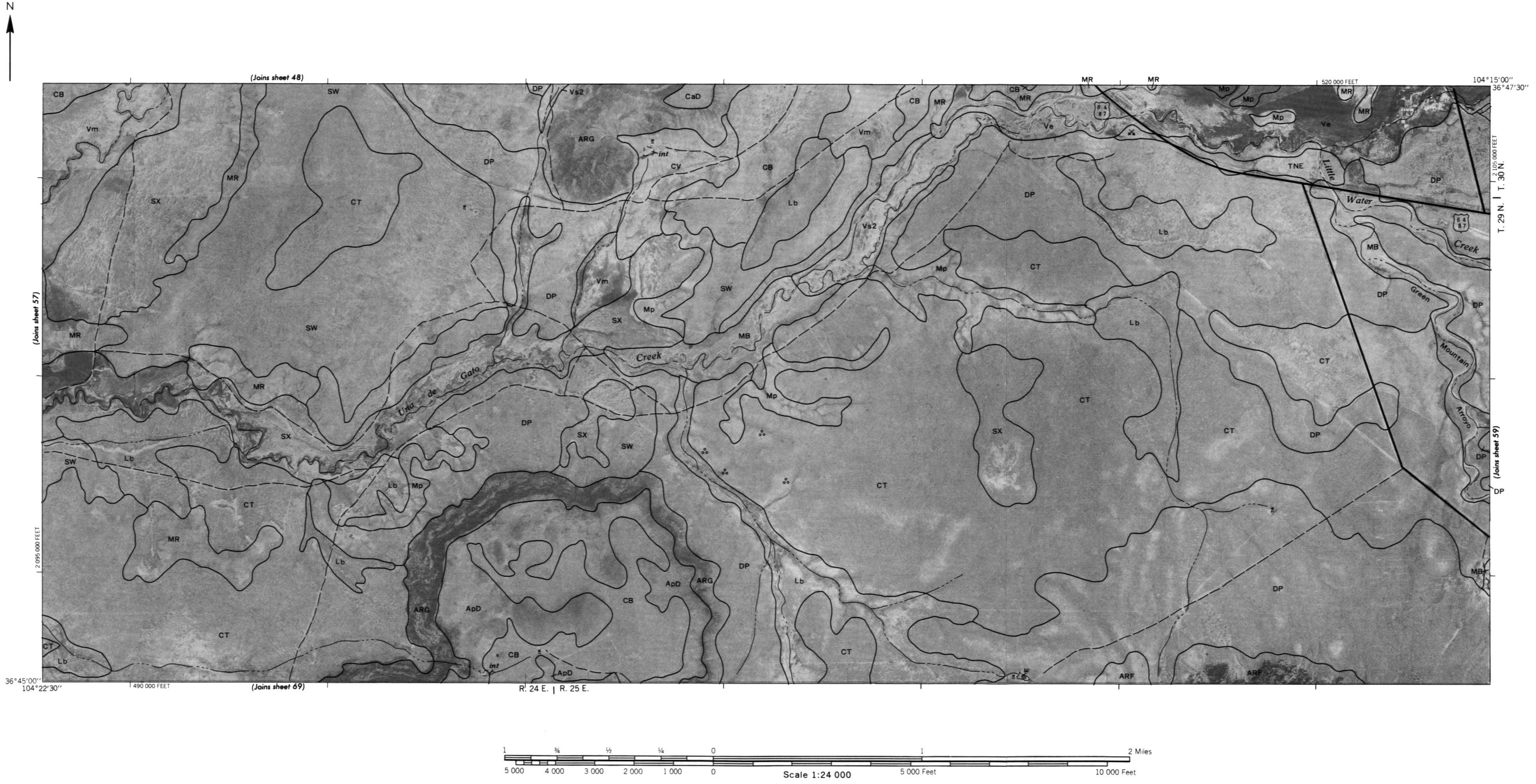
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 57

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 58



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 58

N

1 ¾ ½ ¼ 0 1 2 Miles

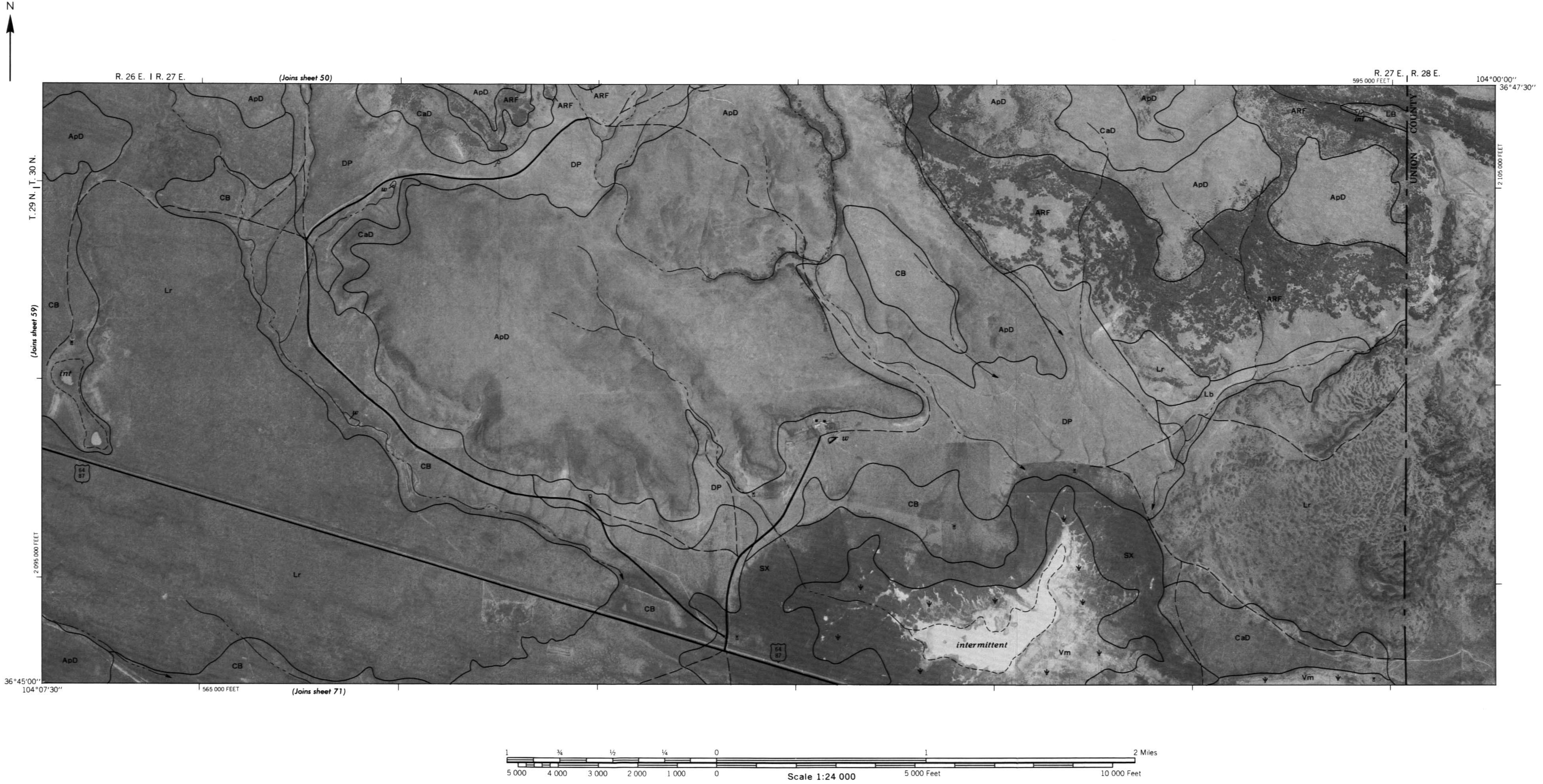
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 59

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 60



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 60

COLFAX COUNTY, NEW MEXICO NO. 61

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 62

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

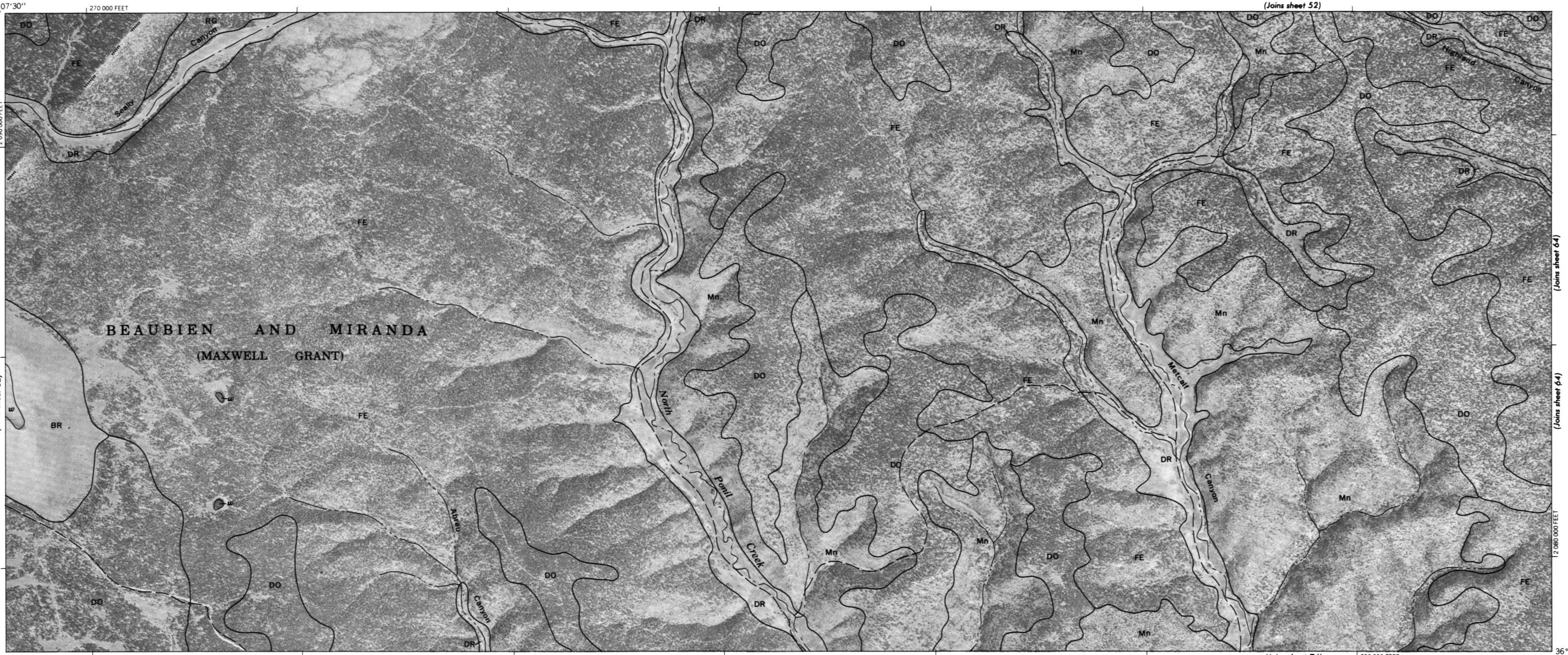
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

63

N

105°07'30"
36°45'00"
270 000 FEET
(Joins sheet 52)
2 090 000 FEET
(Joins sheet 62)
(Joins sheet 64)
2 080 000 FEET



(Joins sheet 74)
300 000 FEET
36°42'30"
105°00'00"

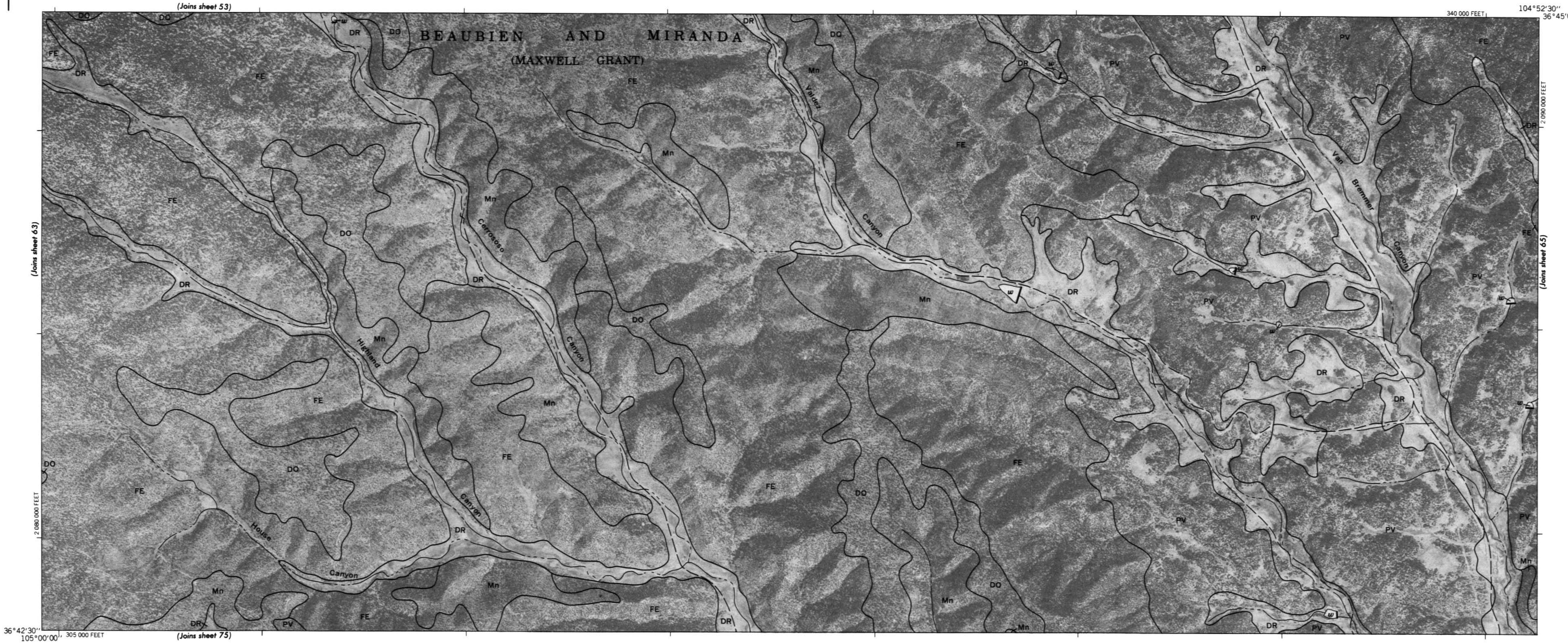
1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

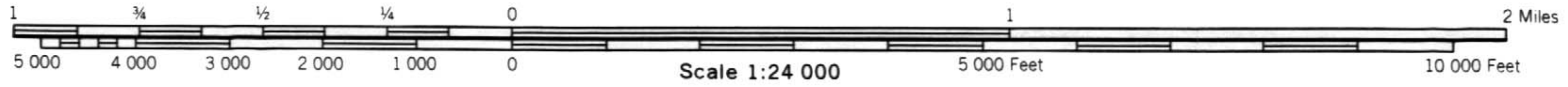
COLFAX COUNTY, NEW MEXICO NO. 63

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 64





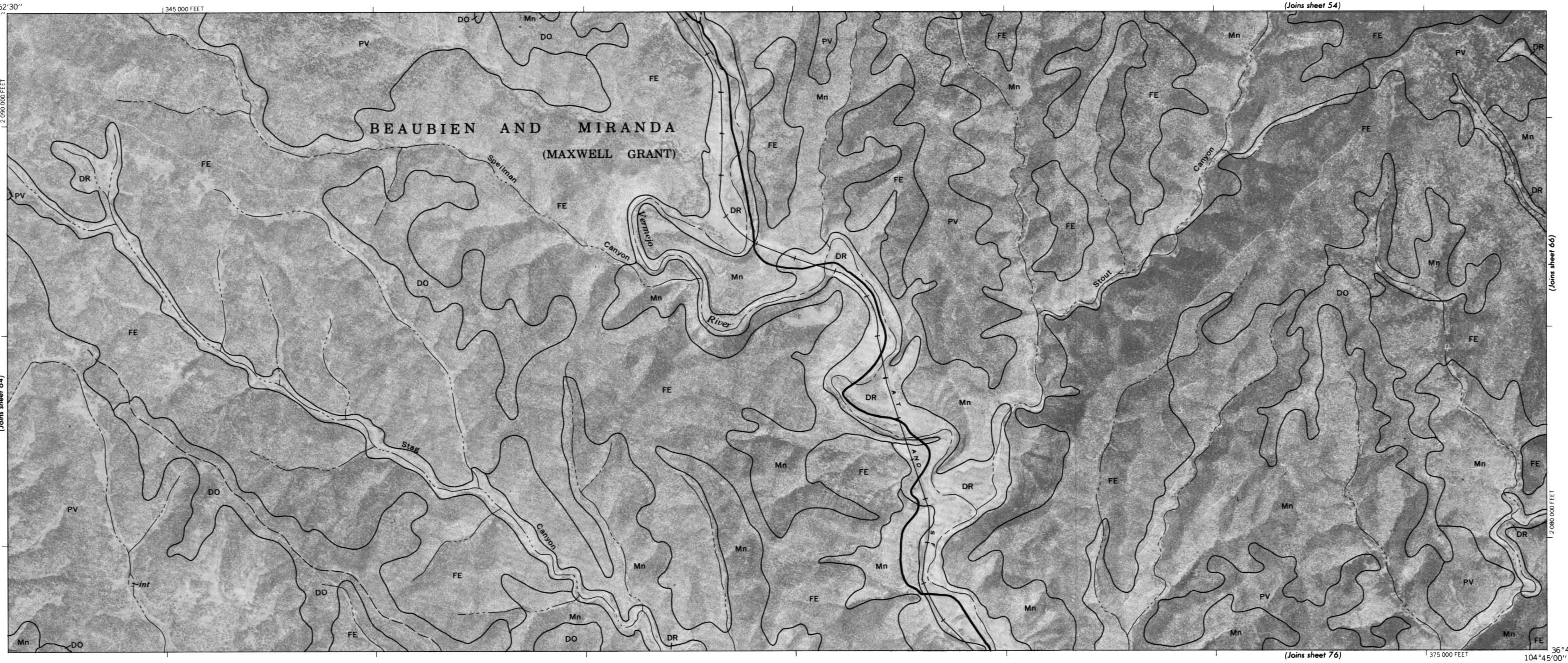
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 64

65

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 66

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

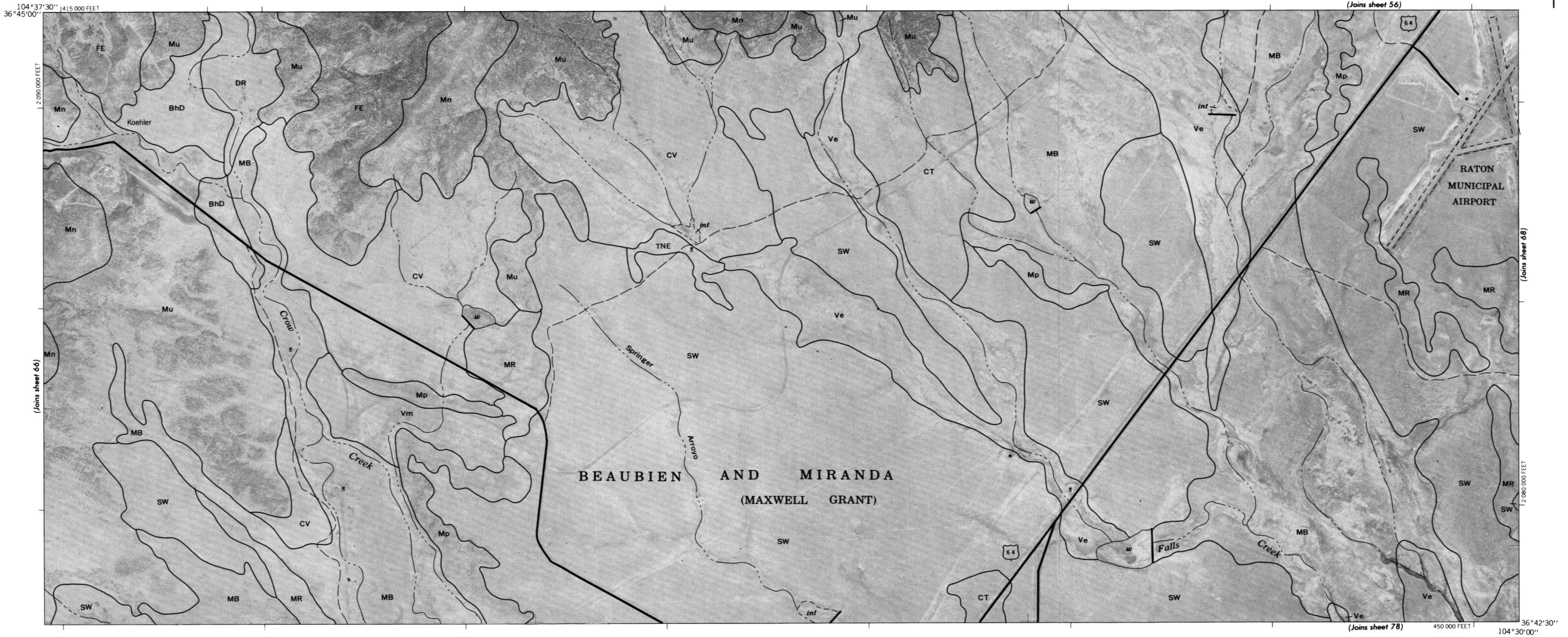
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

67

N

COLFAX COUNTY, NEW MEXICO NO. 67

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

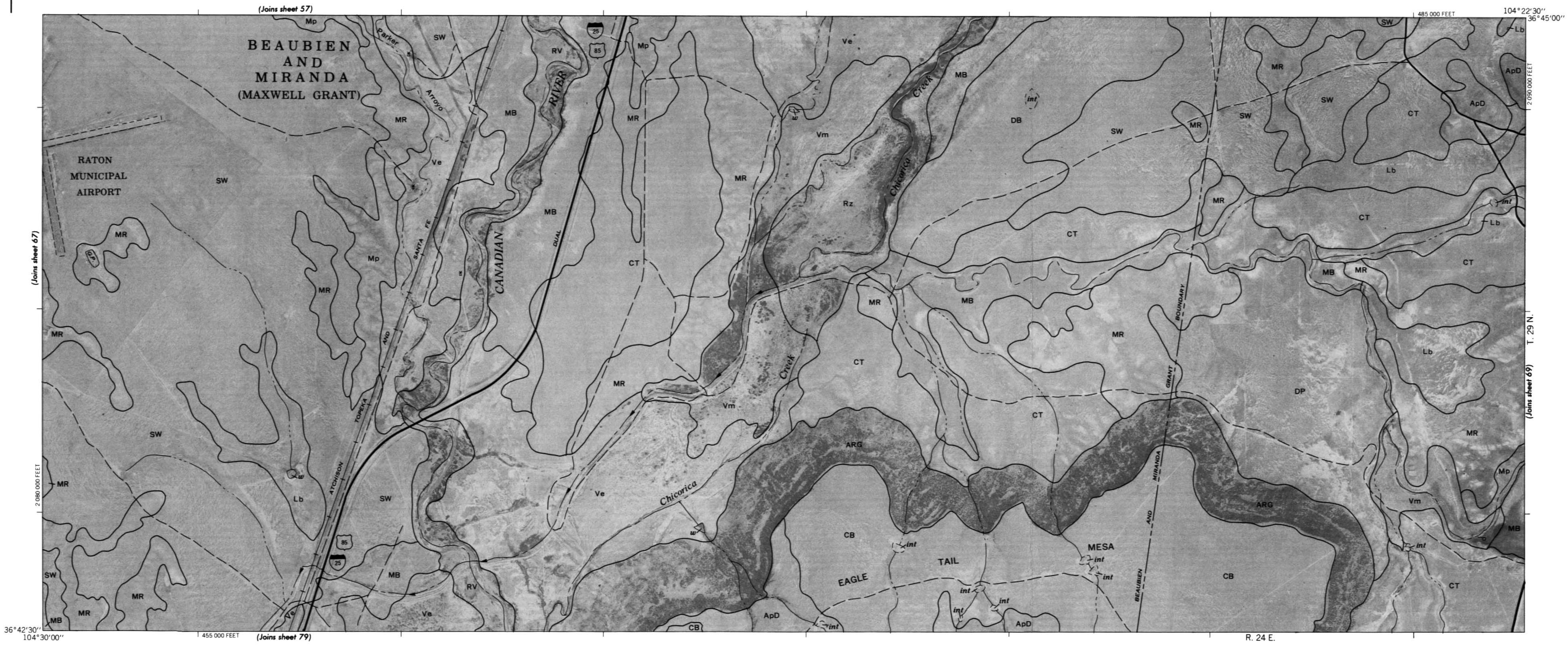


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 68



1 ¾ ½ ¼ 0 1 2 Miles

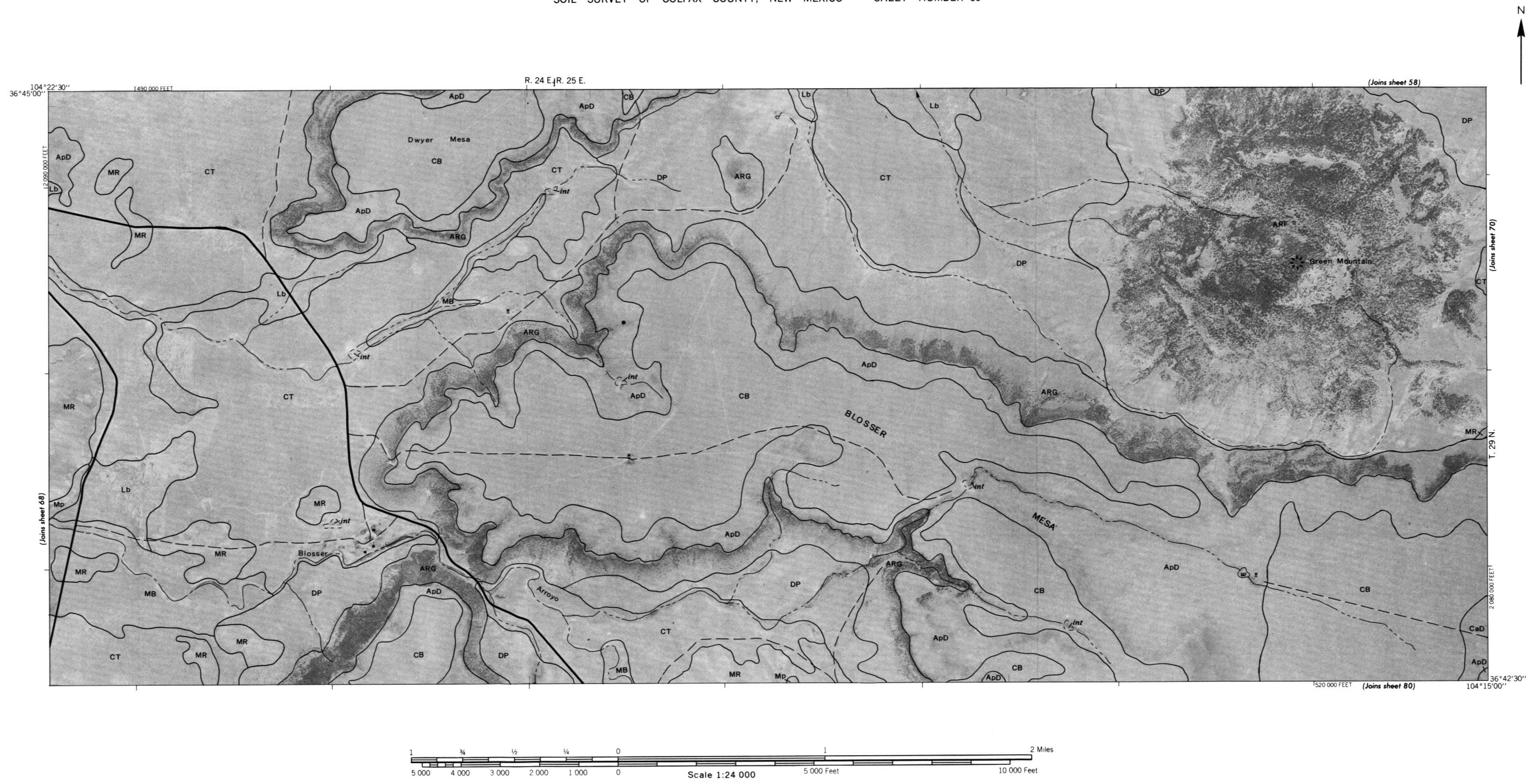
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 69

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 70

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

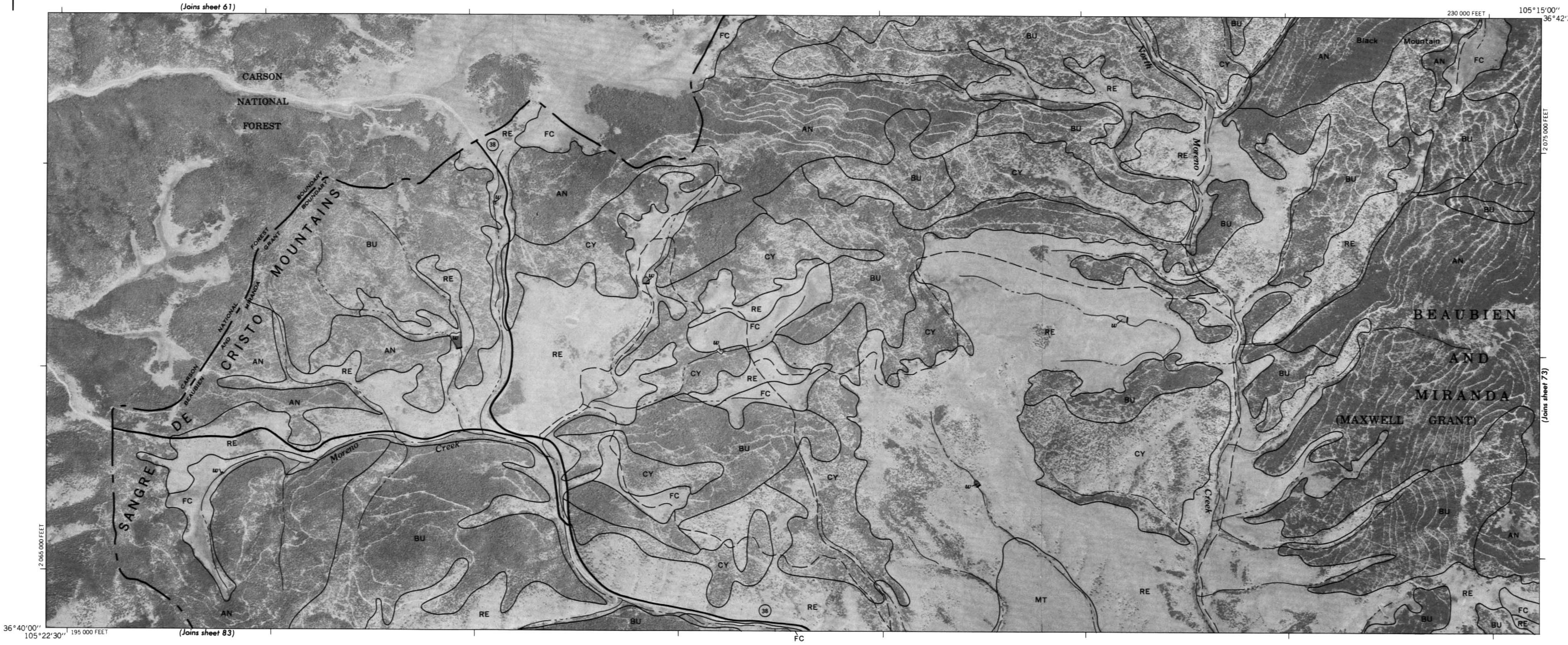
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 71

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 72



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 73

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 74

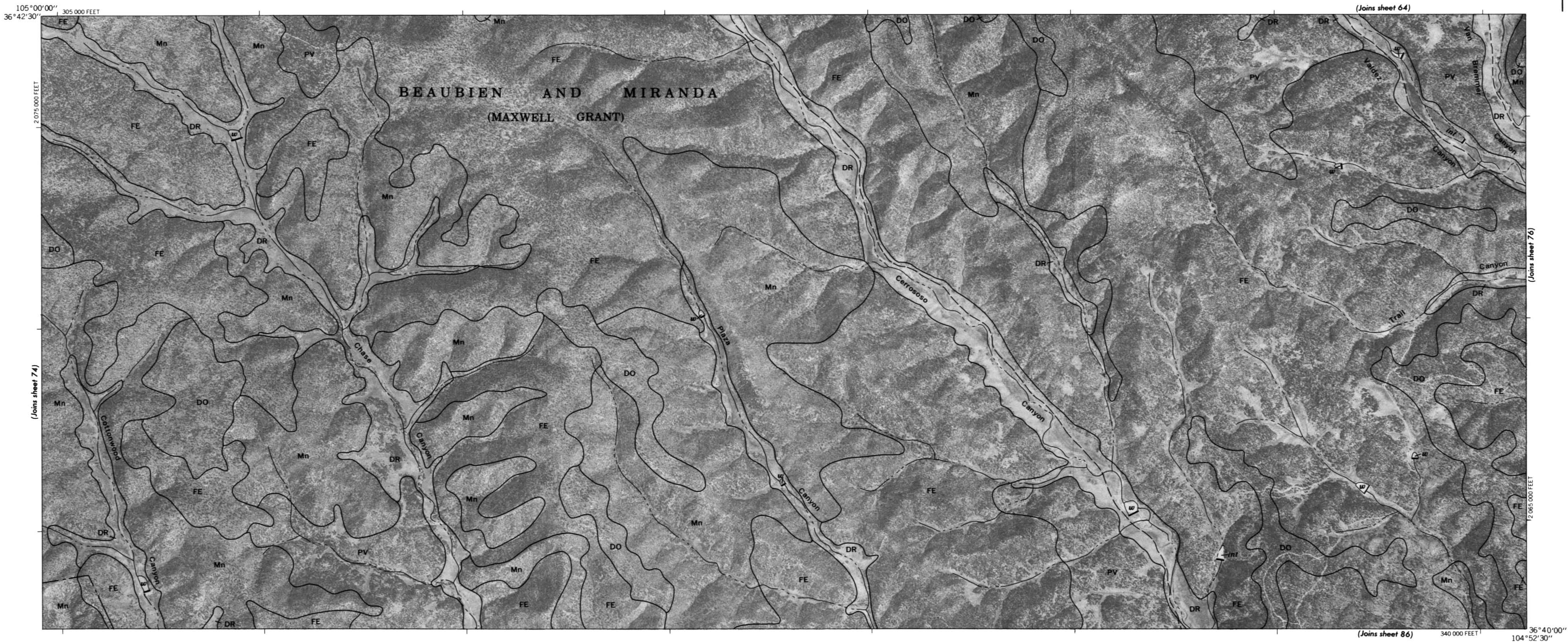
1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 74

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



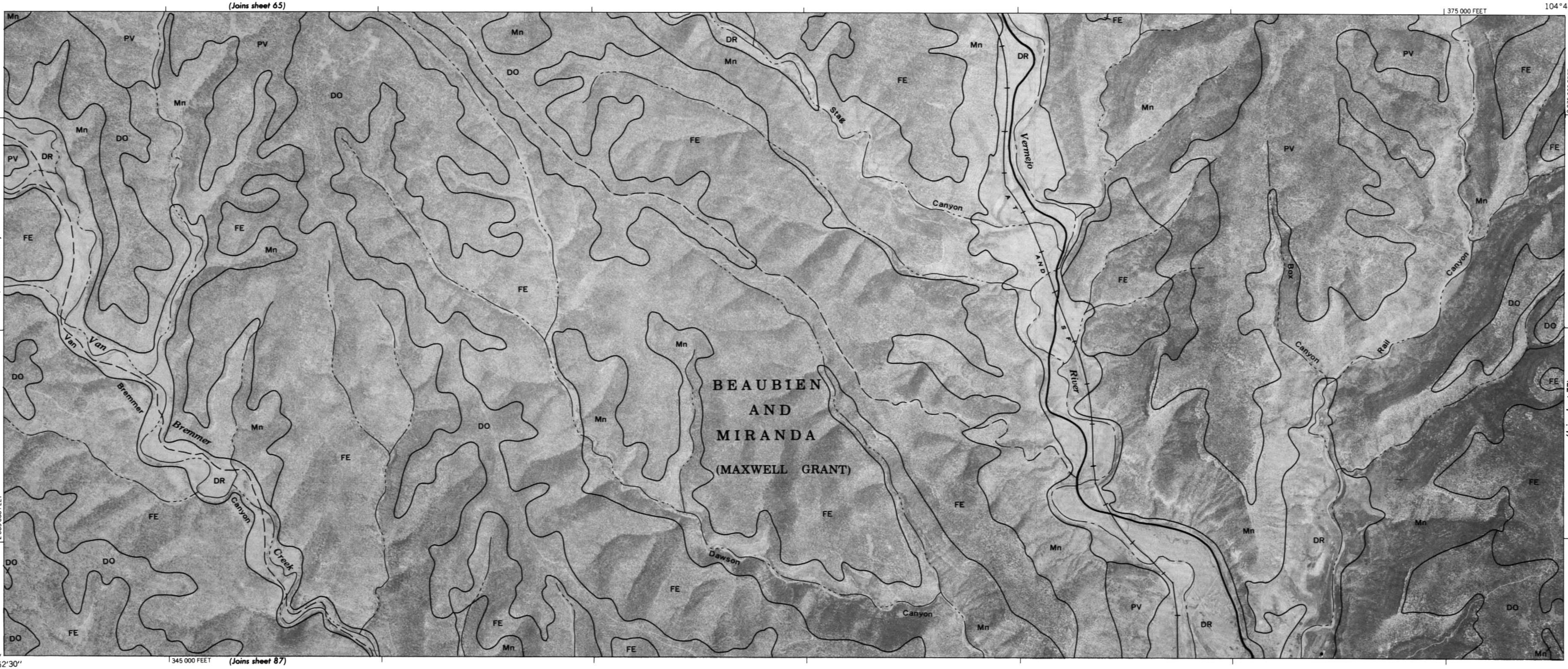
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 76



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

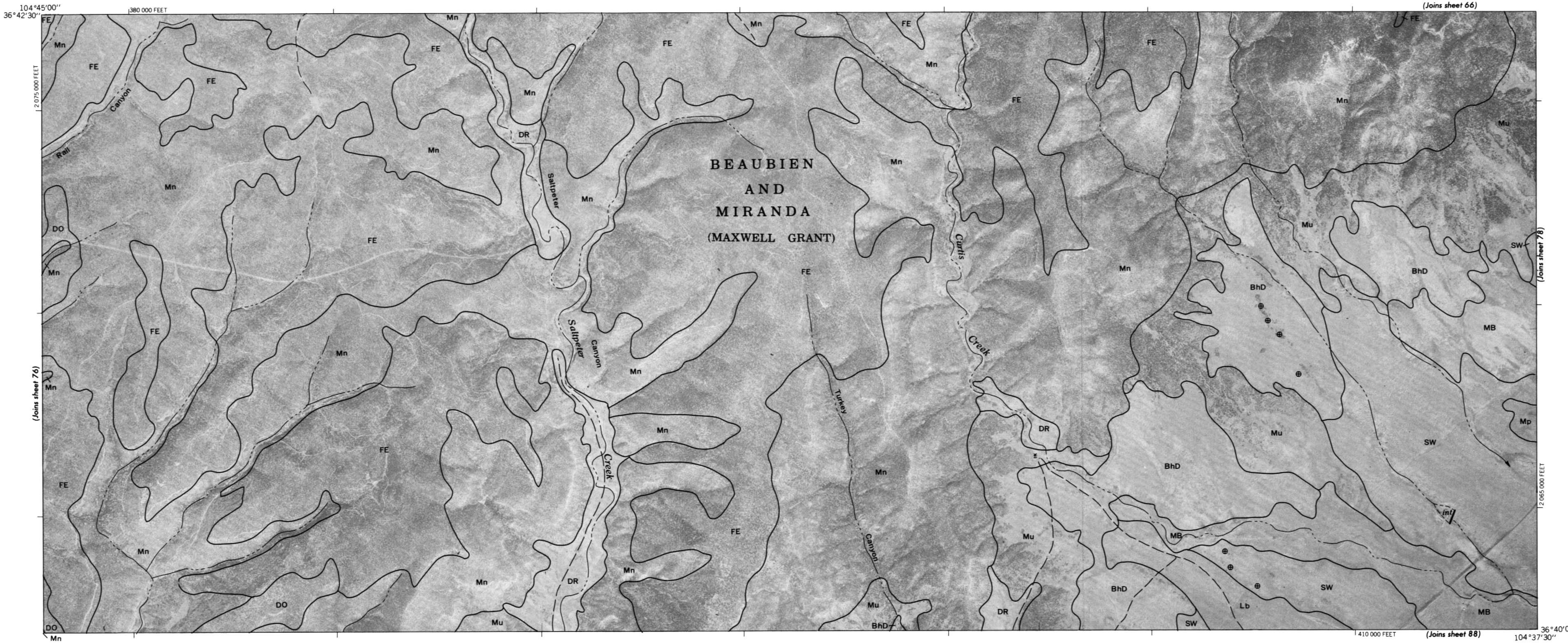
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 76

N

COLFAX COUNTY, NEW MEXICO NO. 77

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



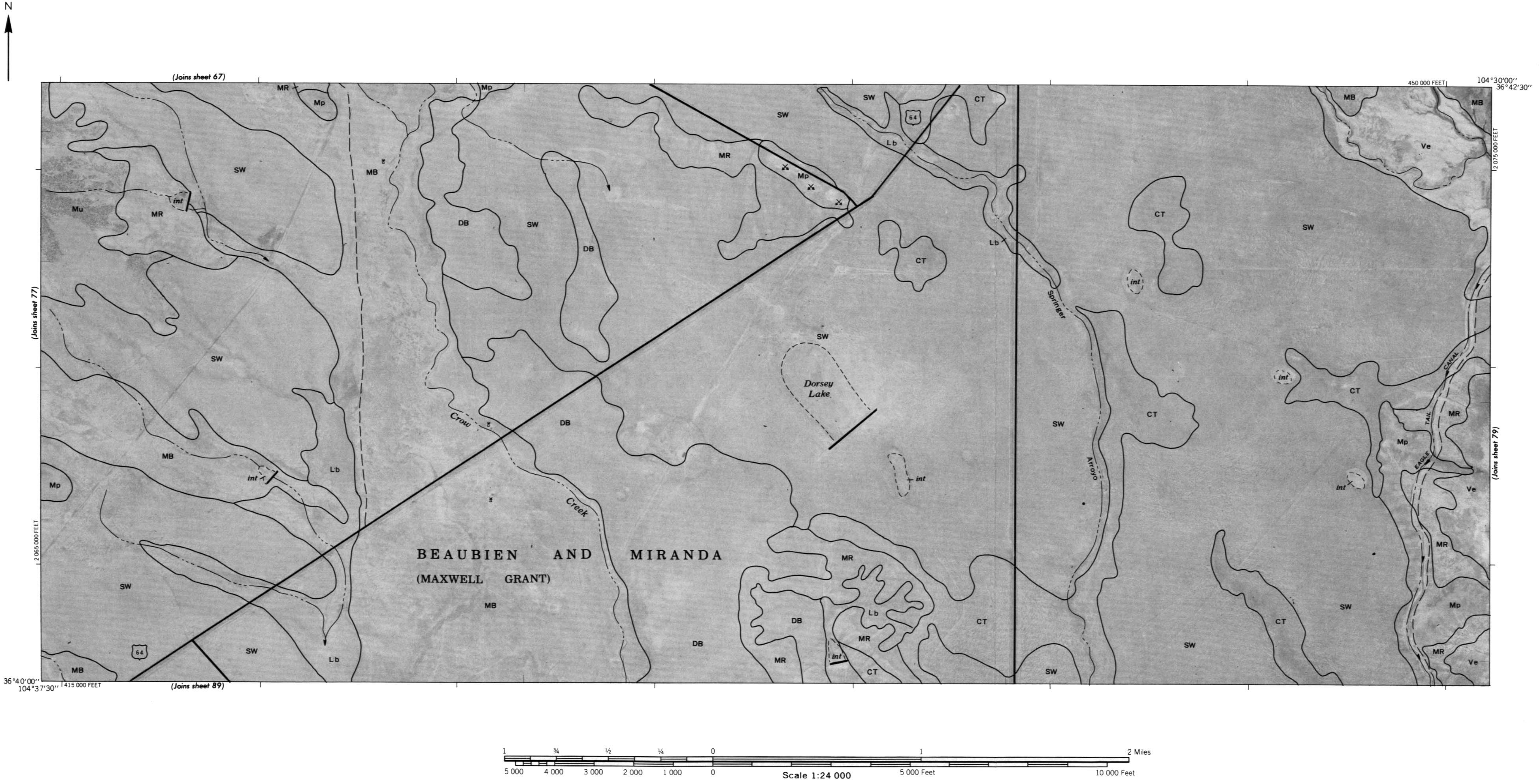
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

(78)

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 78

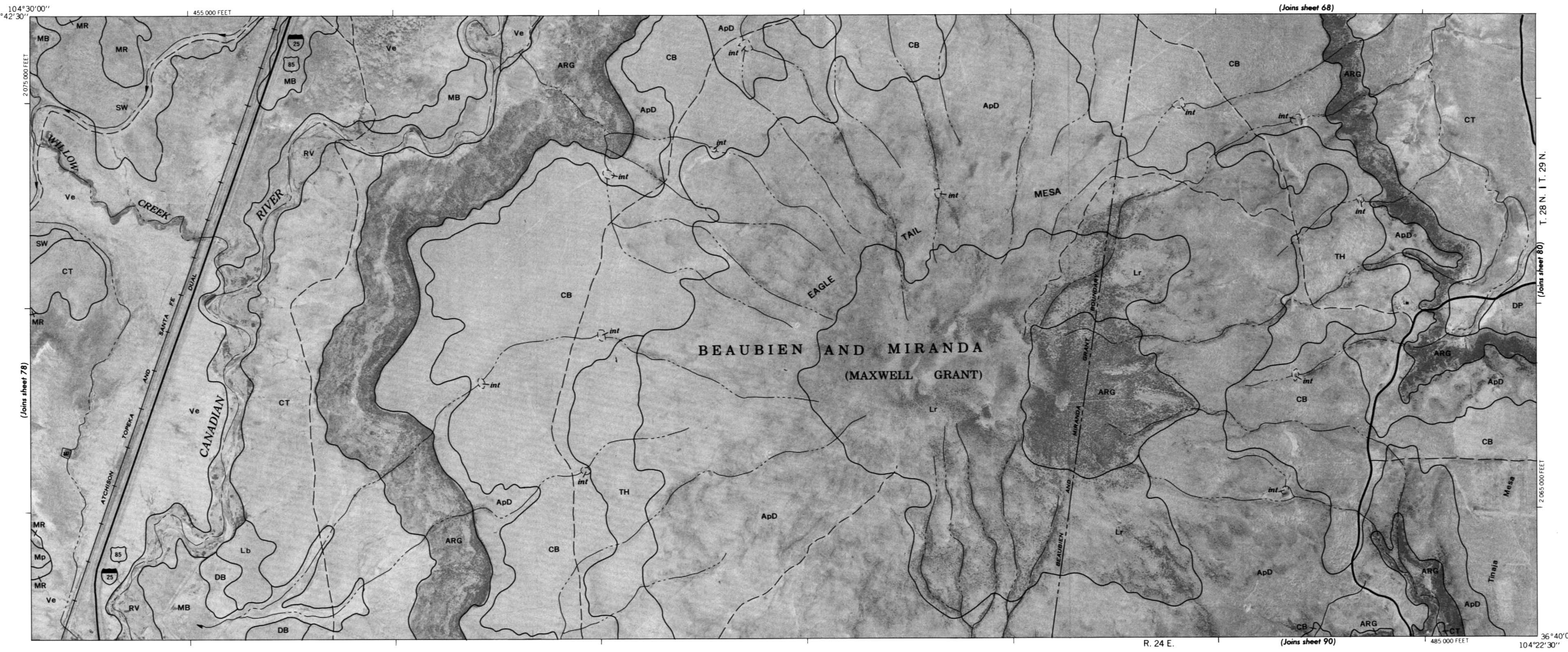


Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 78

COLFAX COUNTY, NEW MEXICO NO. 79

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



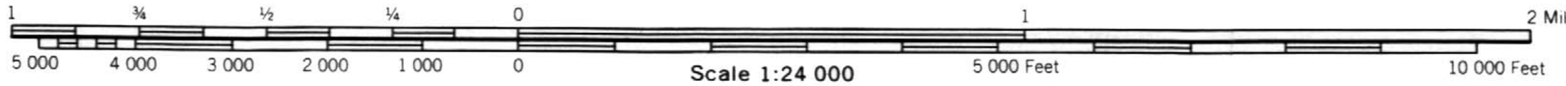
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 80



Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

1 ¾ ½ ¼ 0 1 2 Miles

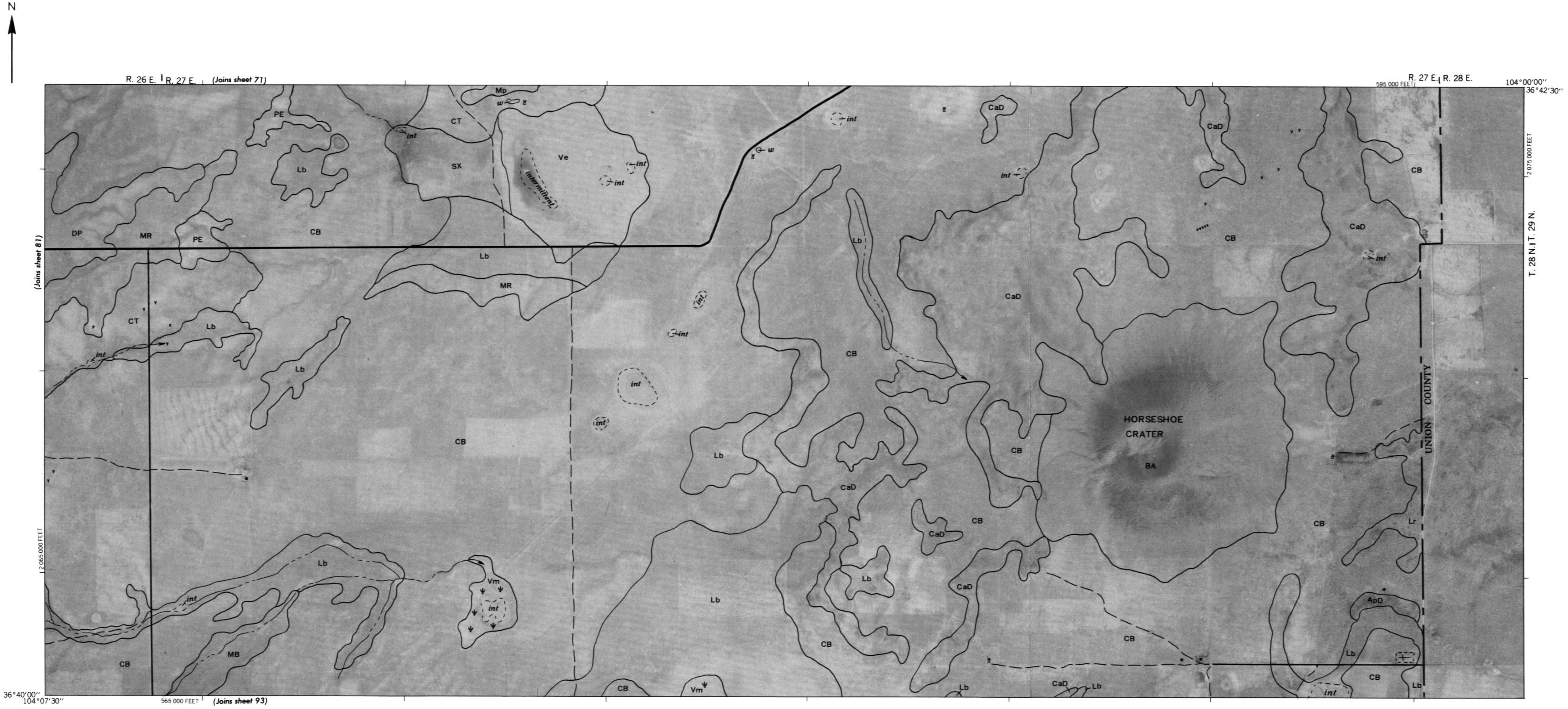
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 81

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 82



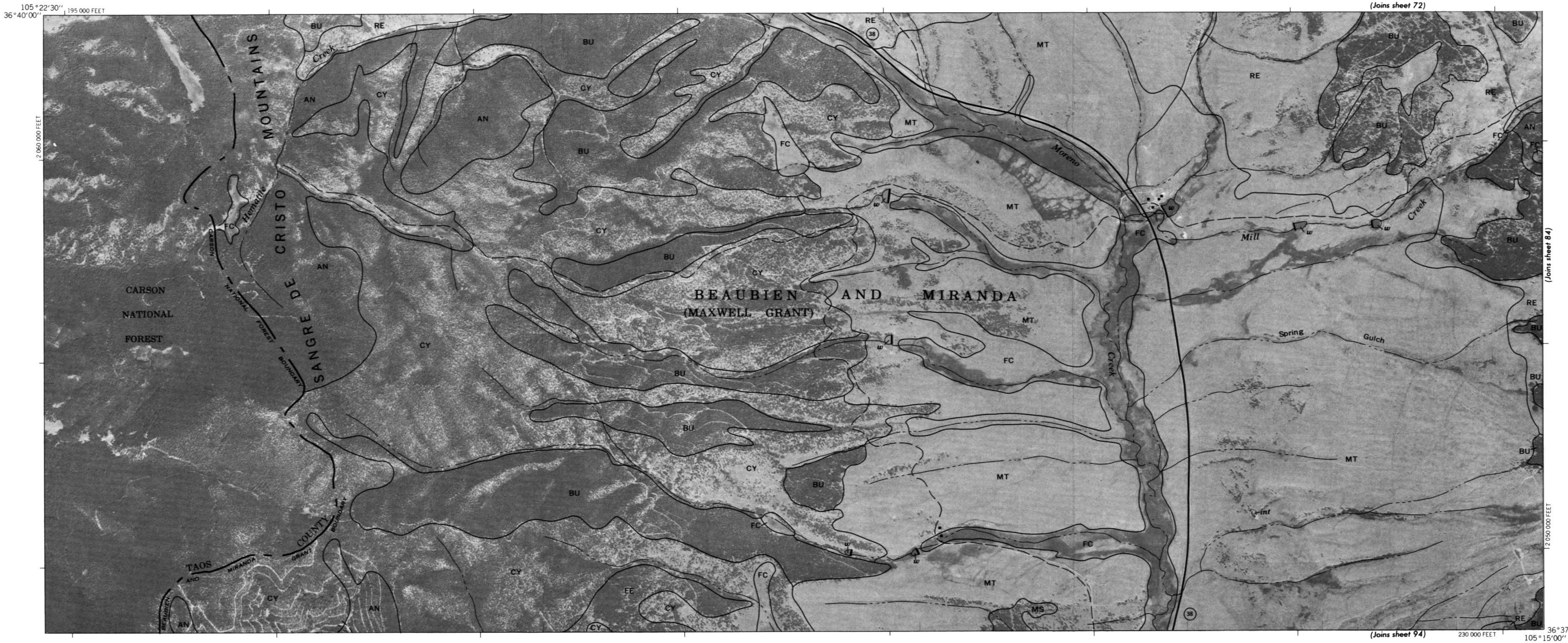
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N



COLFAX COUNTY, NEW MEXICO NO. 83

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

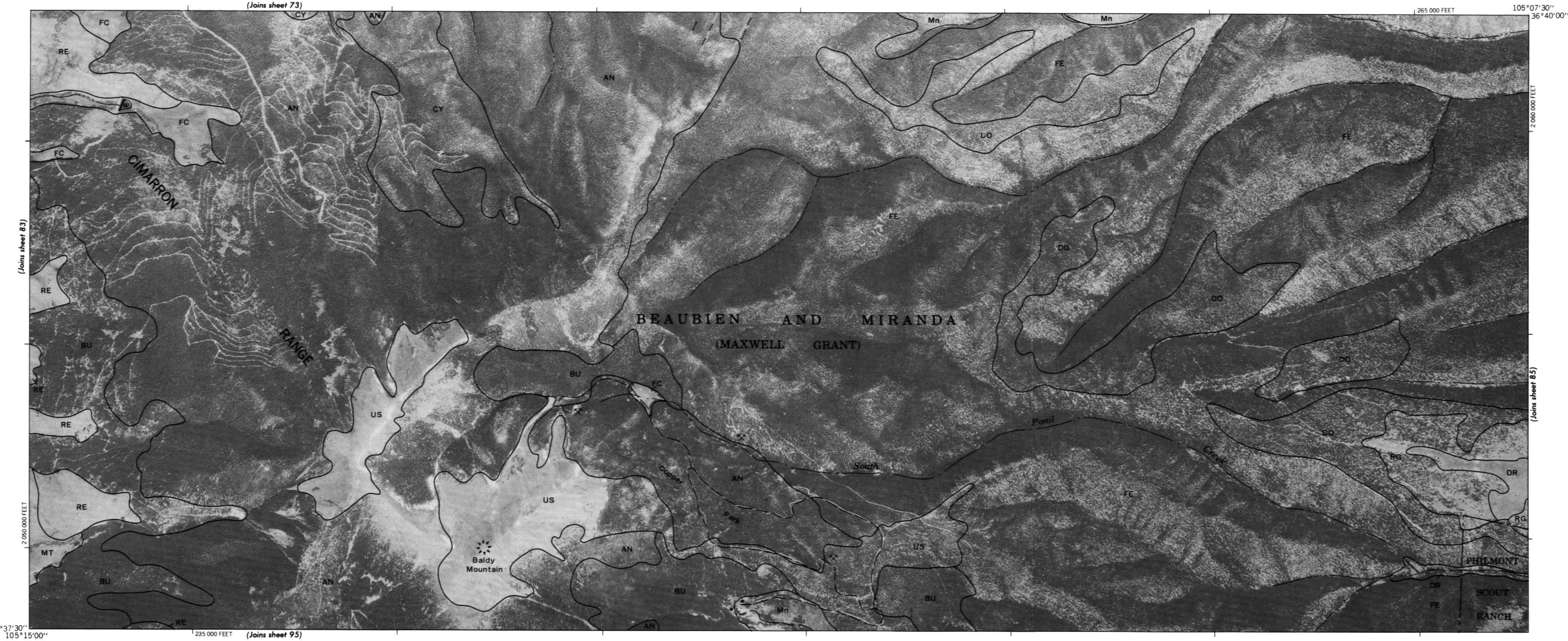
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 84



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 84

85

N

COLFAX COUNTY, NEW MEXICO NO. 85

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

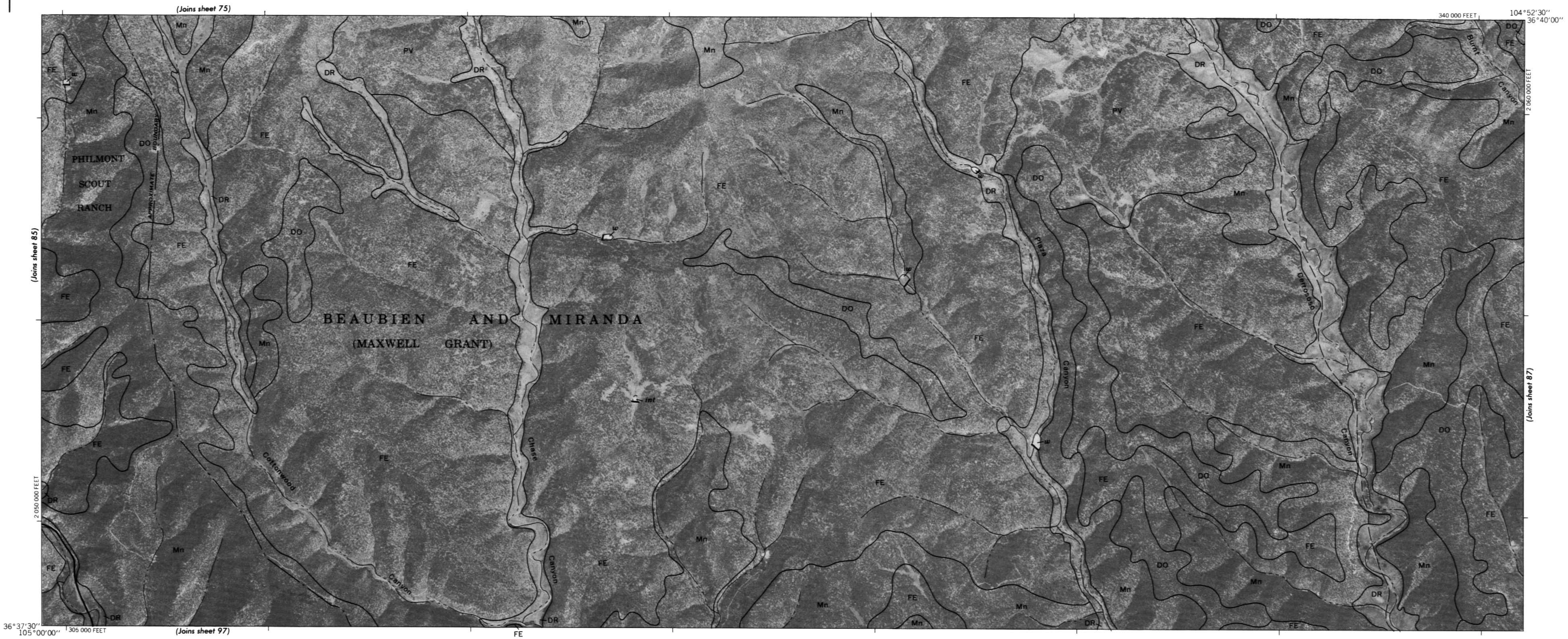
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 86

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

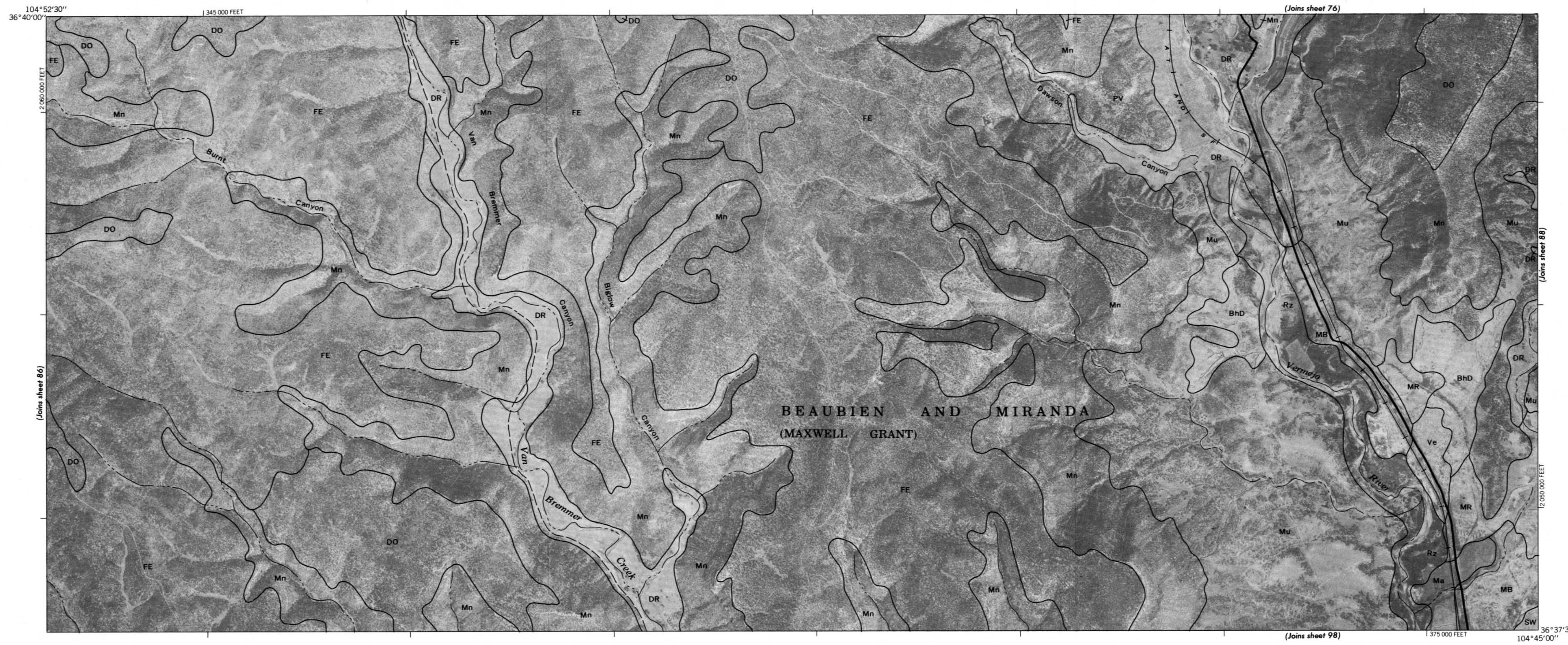
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

COLFAX COUNTY, NEW MEXICO NO. 87

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



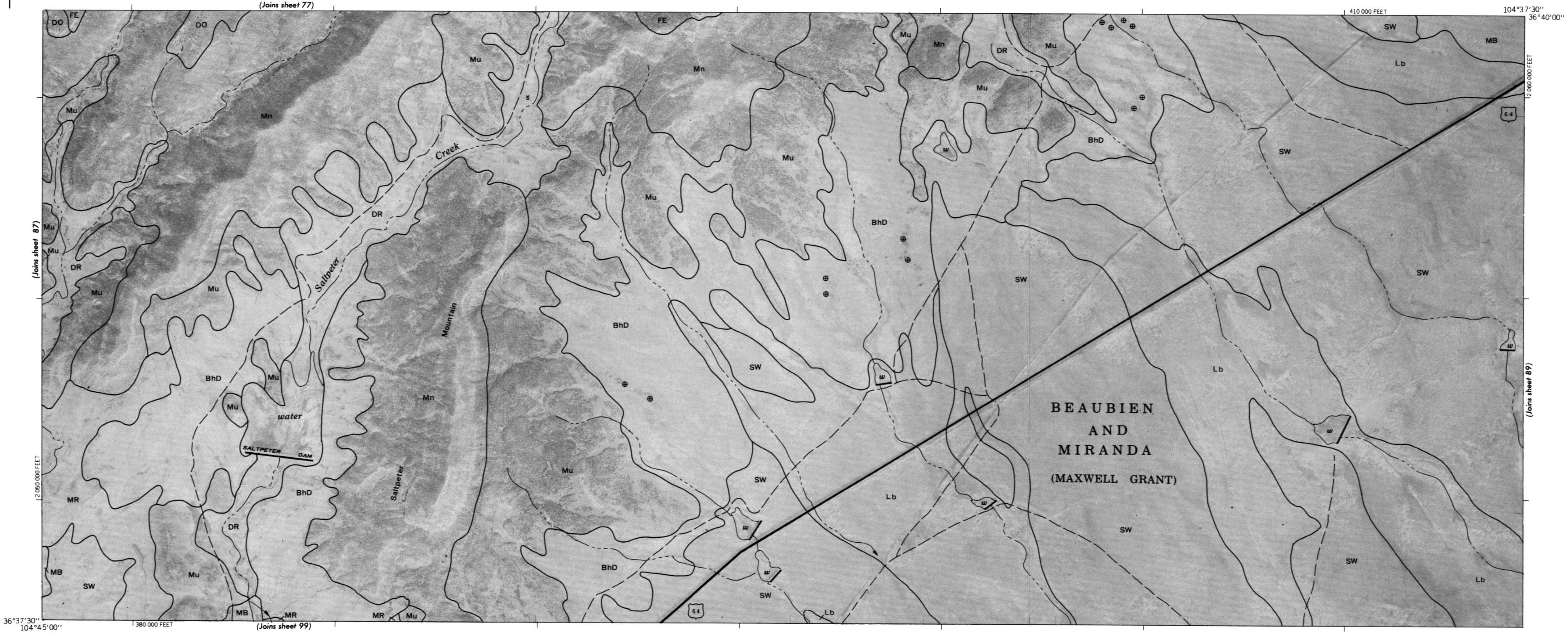
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 88

N



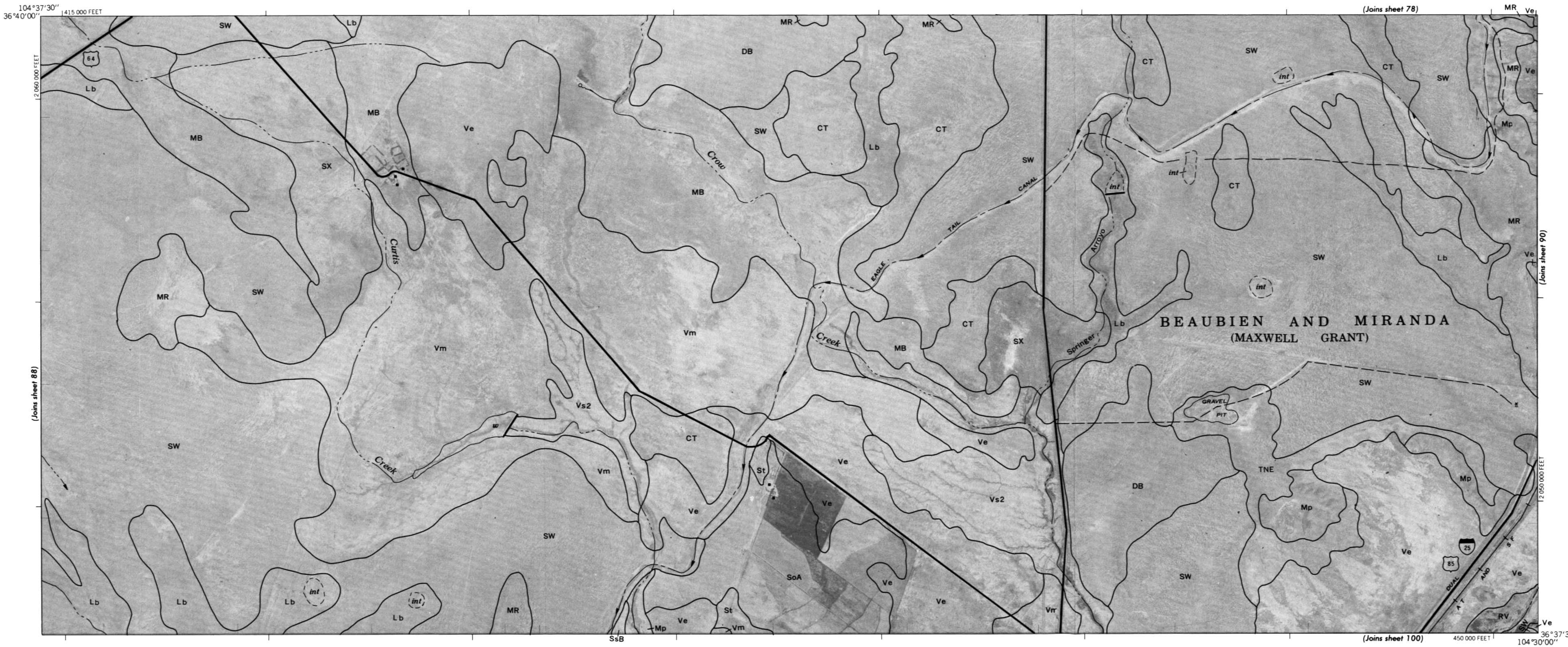
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

N



COLFAX COUNTY, NEW MEXICO NO. 89

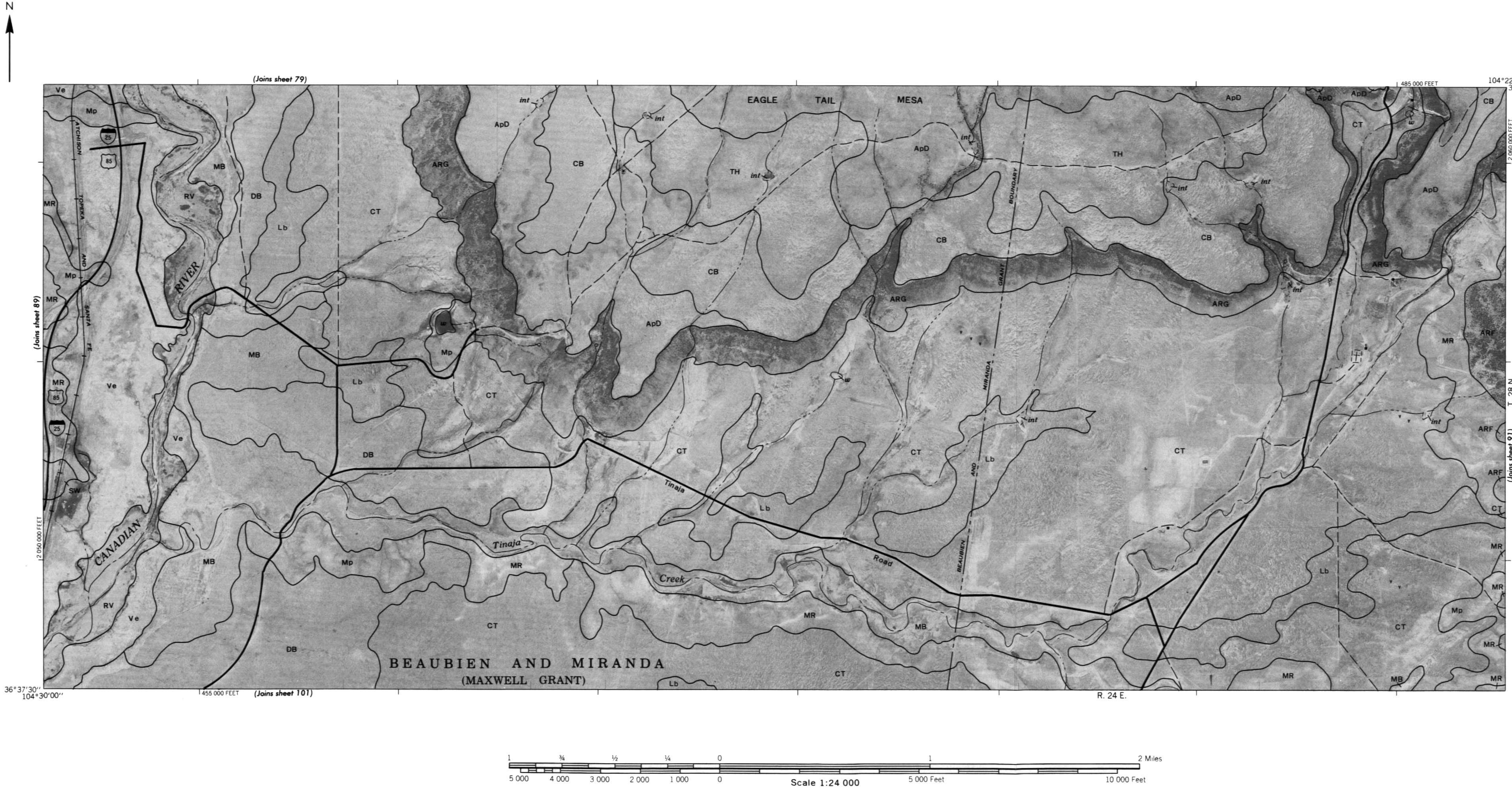
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 90



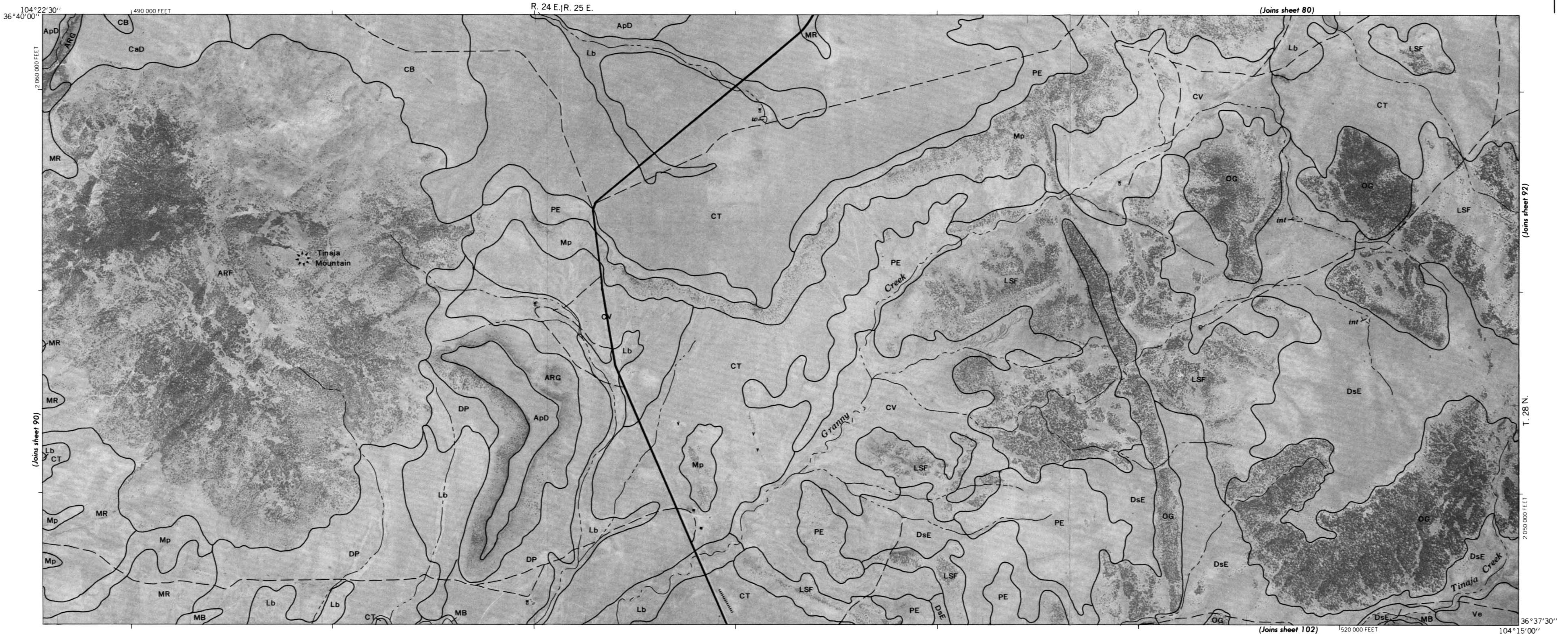
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

91

N

COLFAX COUNTY, NEW MEXICO NO. 91

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 92

N

1 ¾ ½ ¼ 0 1 2 Miles

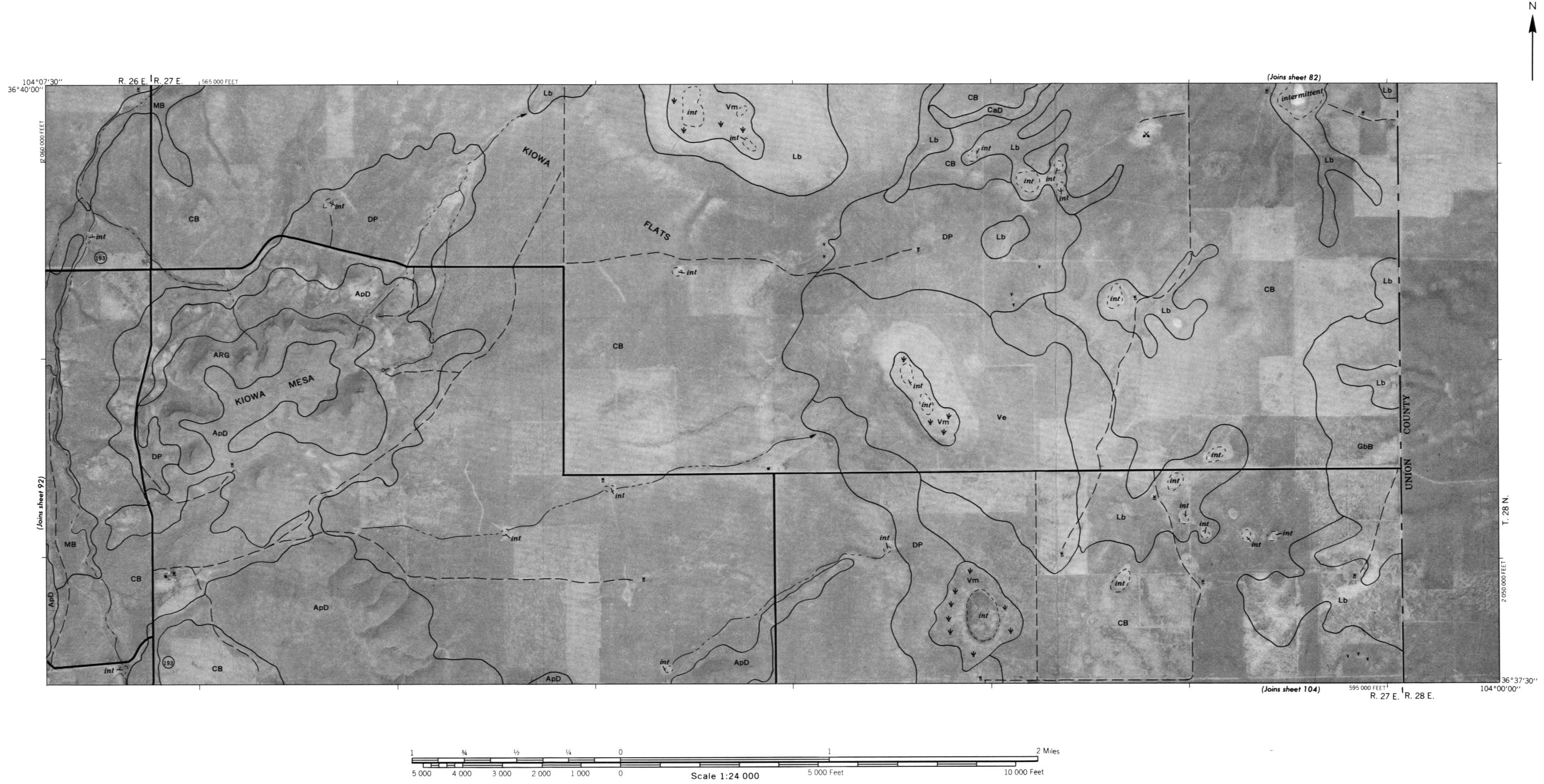
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

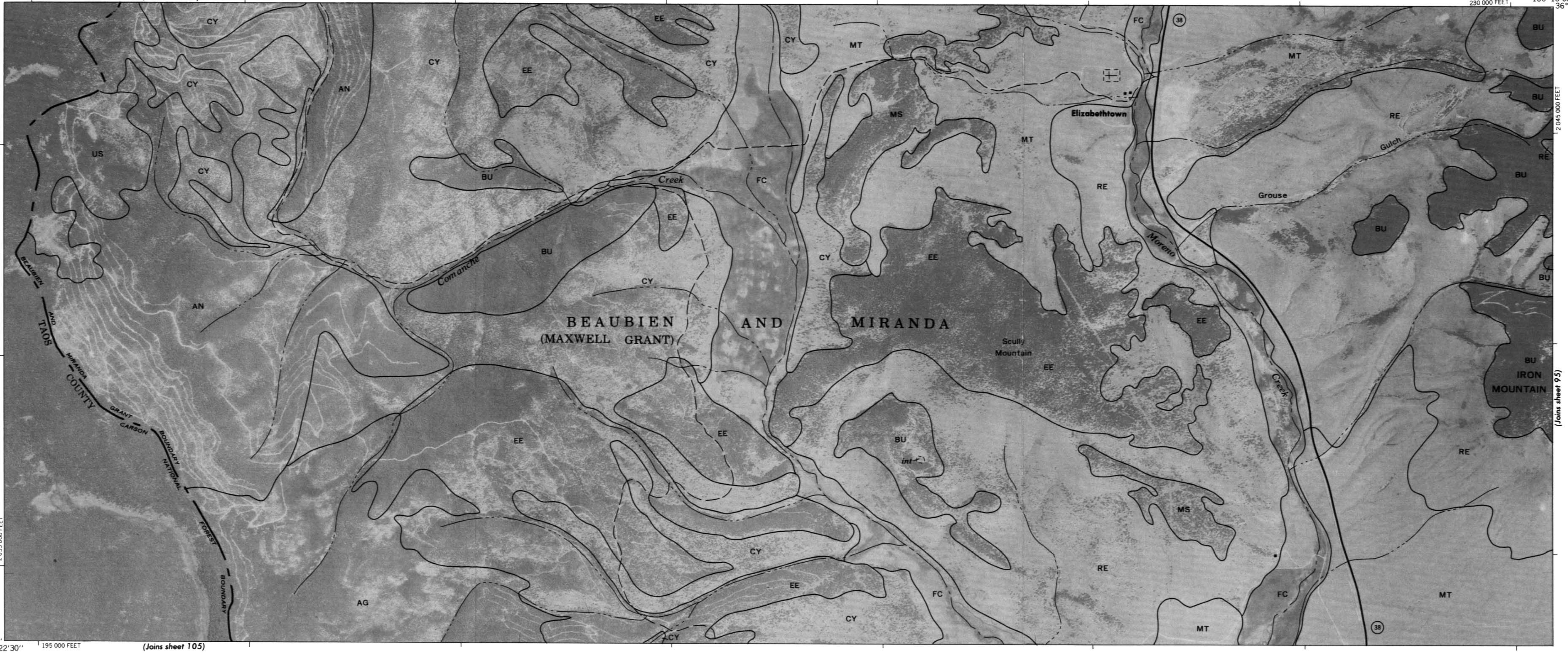
COLFAX COUNTY, NEW MEXICO NO. 93

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 94



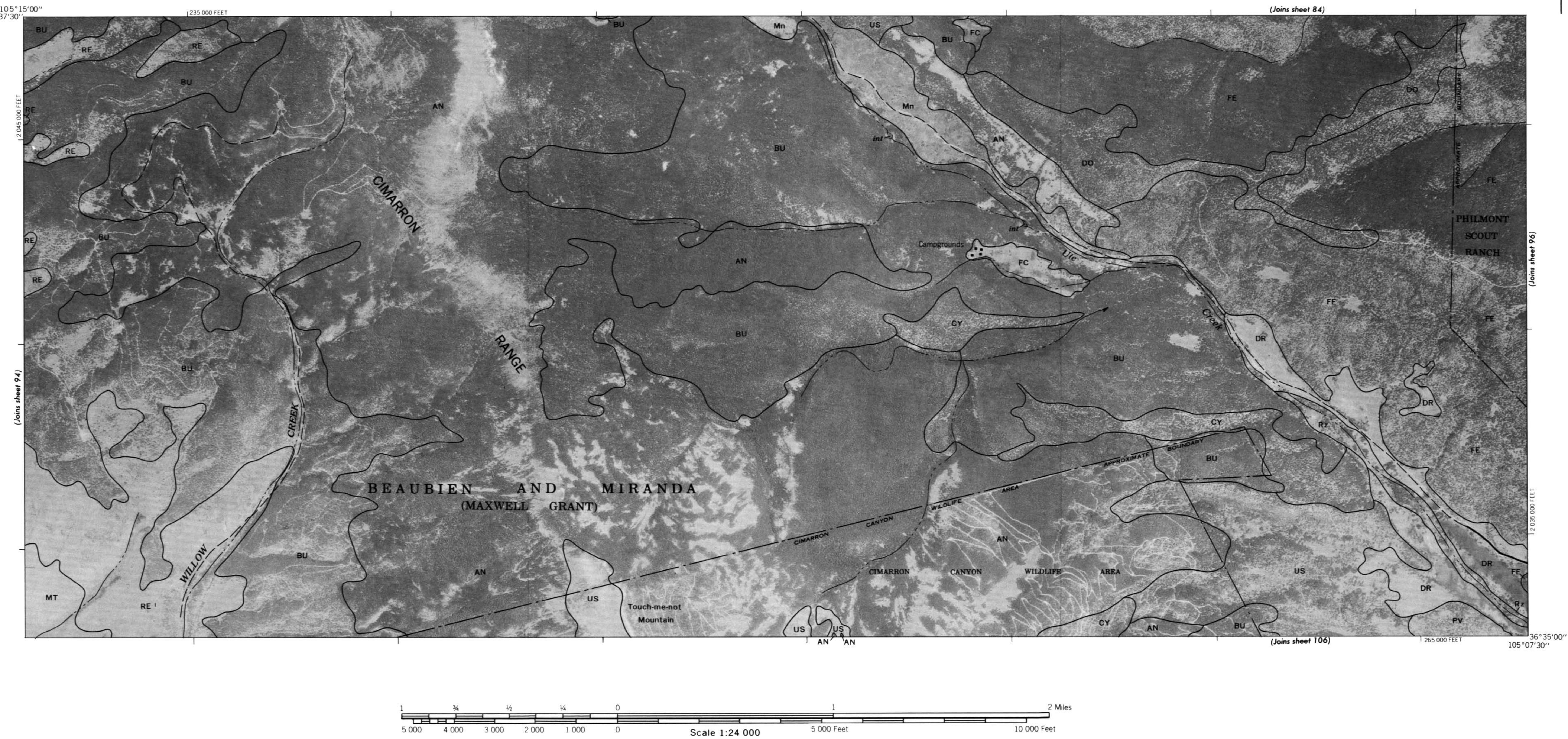
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

95



COLFAX COUNTY, NEW MEXICO NO. 95

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 96

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

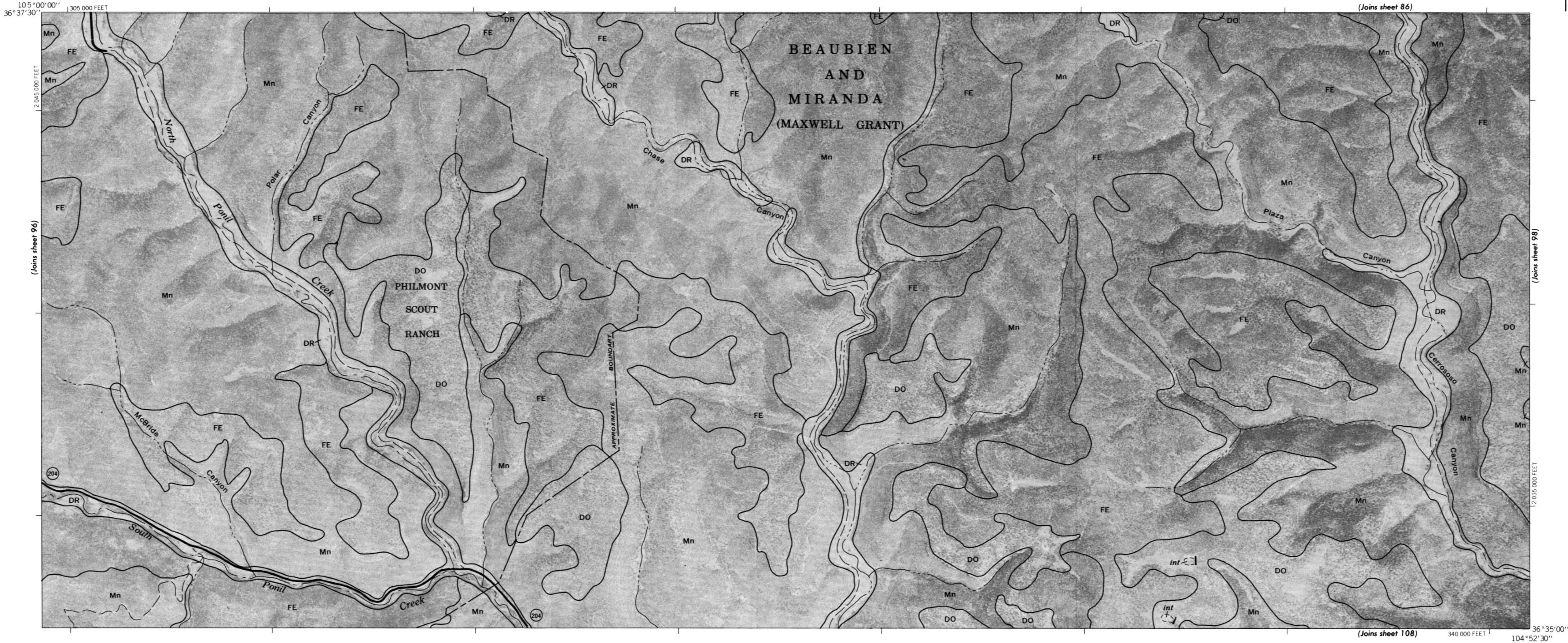
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

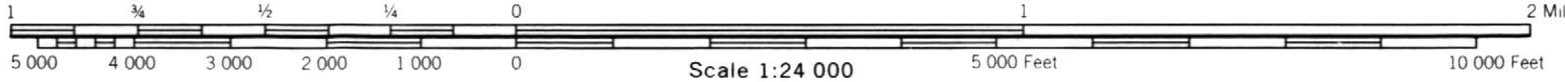
COLFAX COUNTY, NEW MEXICO NO. 96

N

COLFAX COUNTY, NEW MEXICO NO. 97

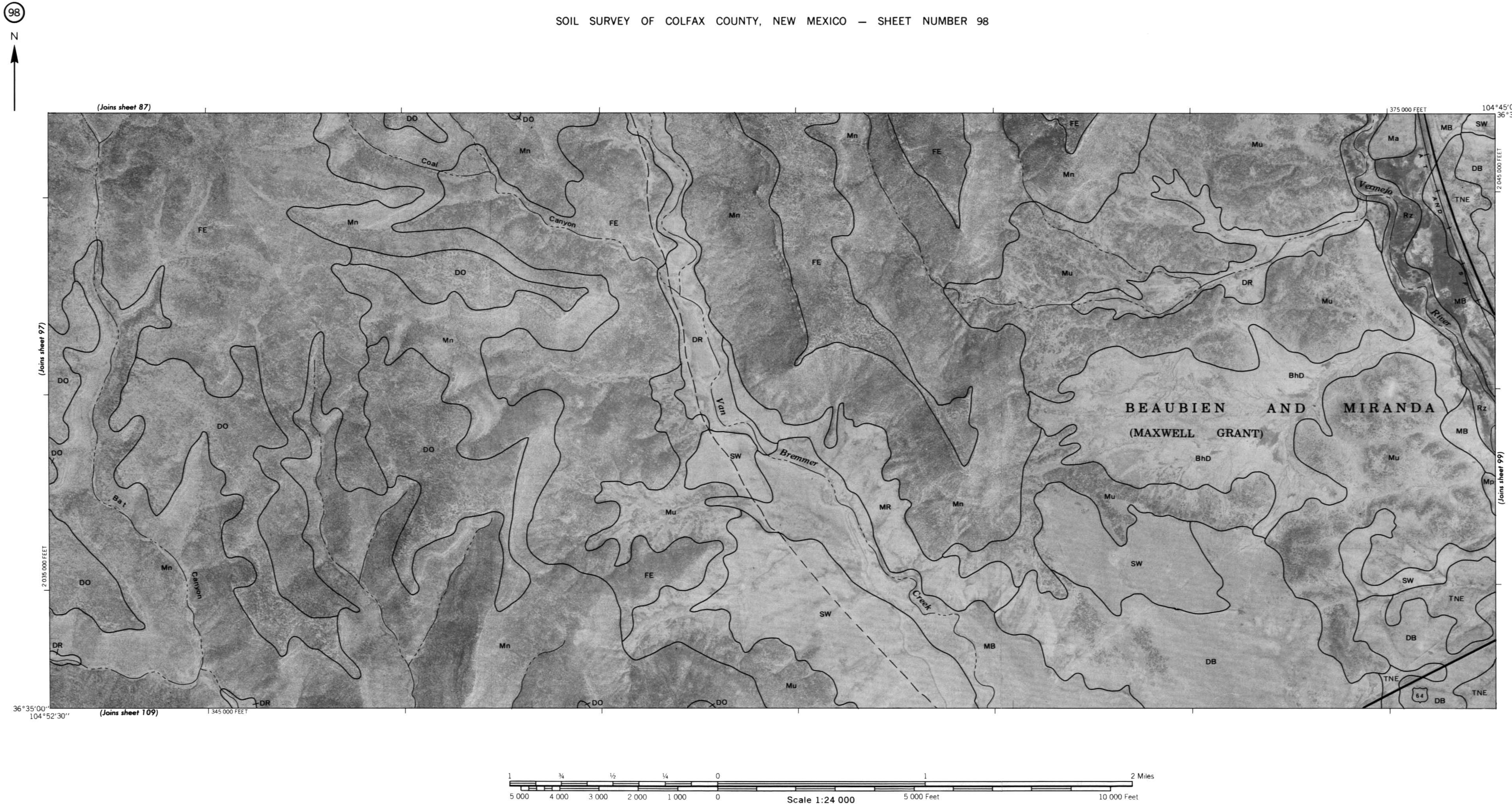
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.





Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 98

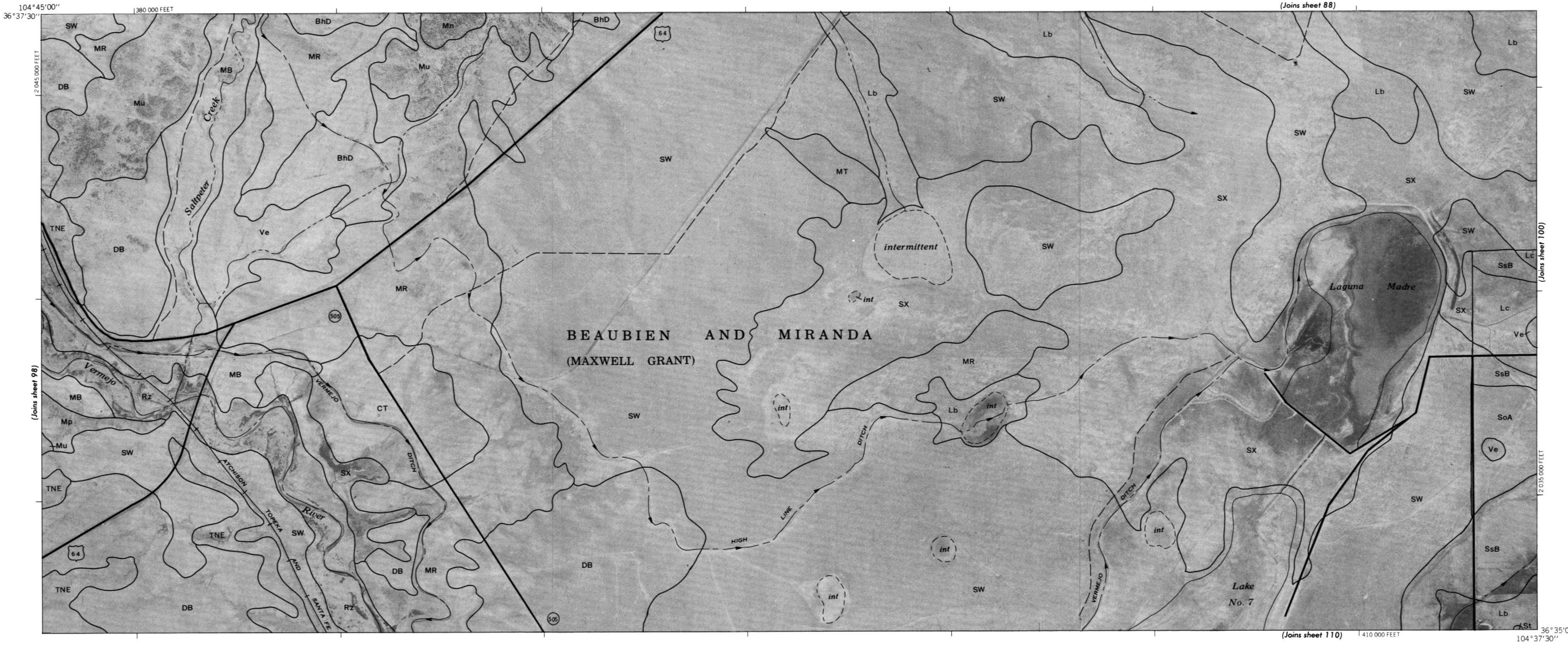


Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 98

COLFAX COUNTY, NEW MEXICO NO. 99

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



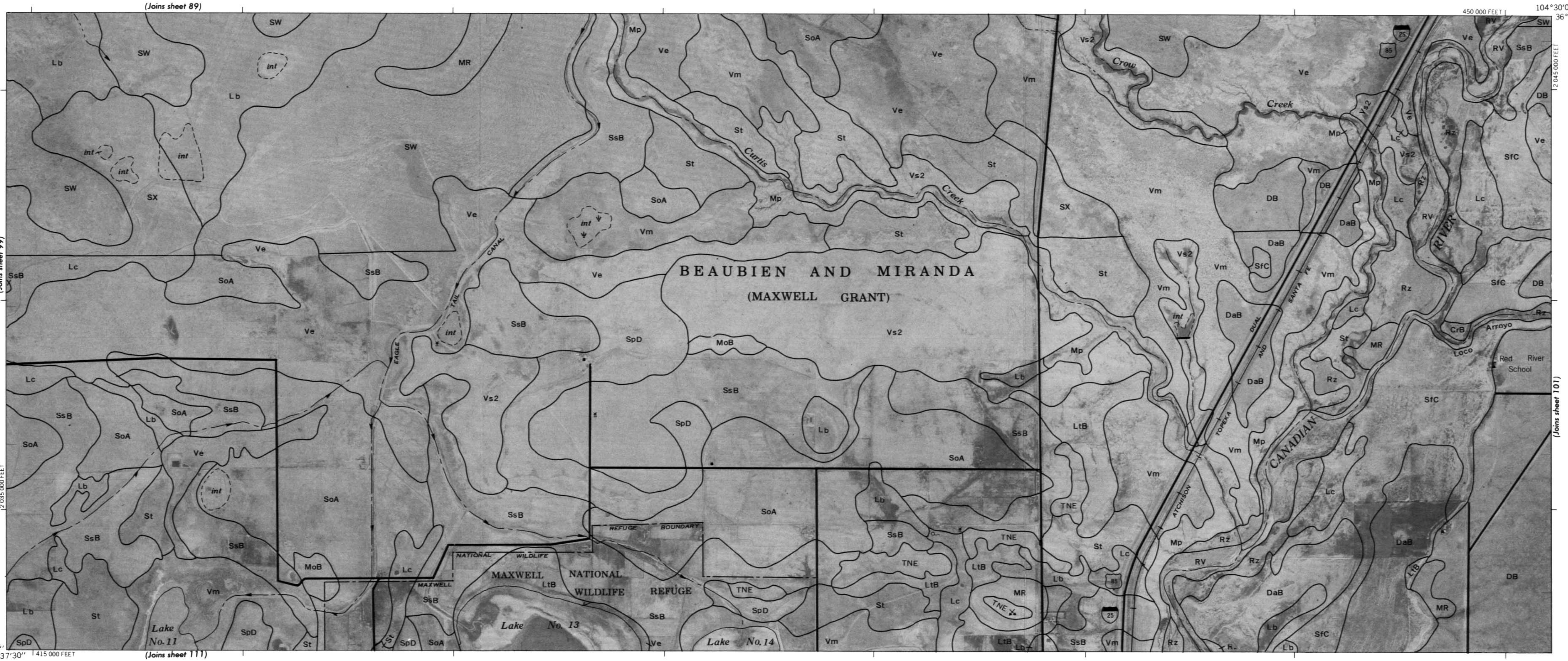
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 100



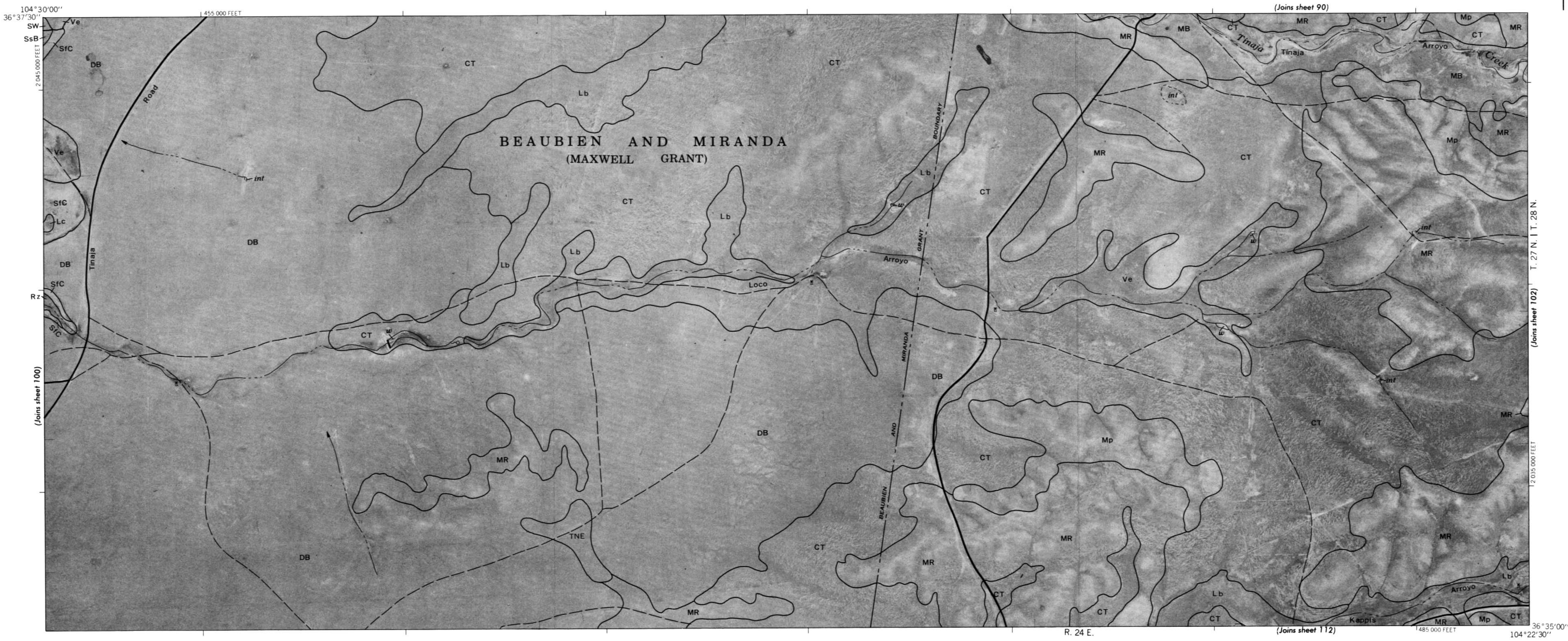
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 100



COLFAX COUNTY, NEW MEXICO NO. 101

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

103

N

COLFAX COUNTY, NEW MEXICO NO. 103

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

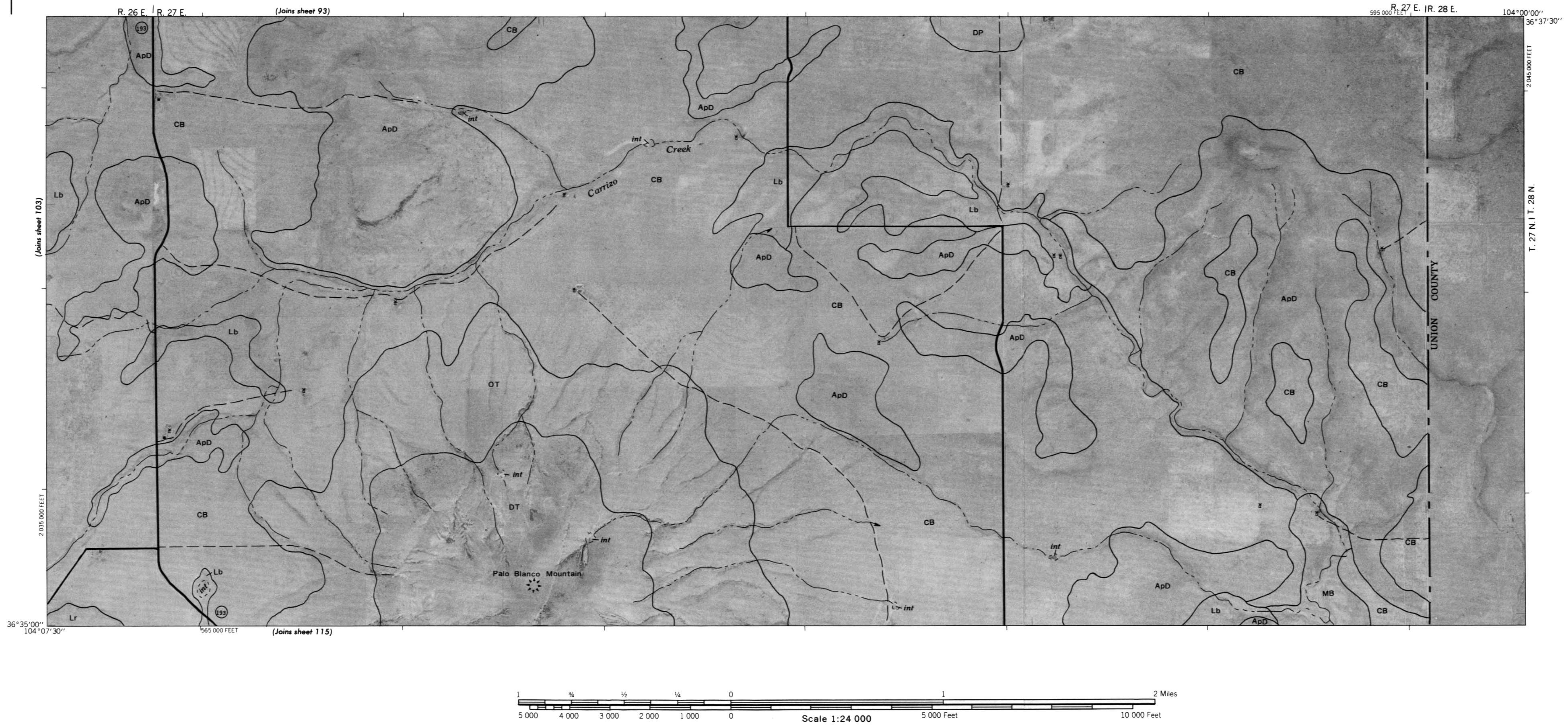
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 104



Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

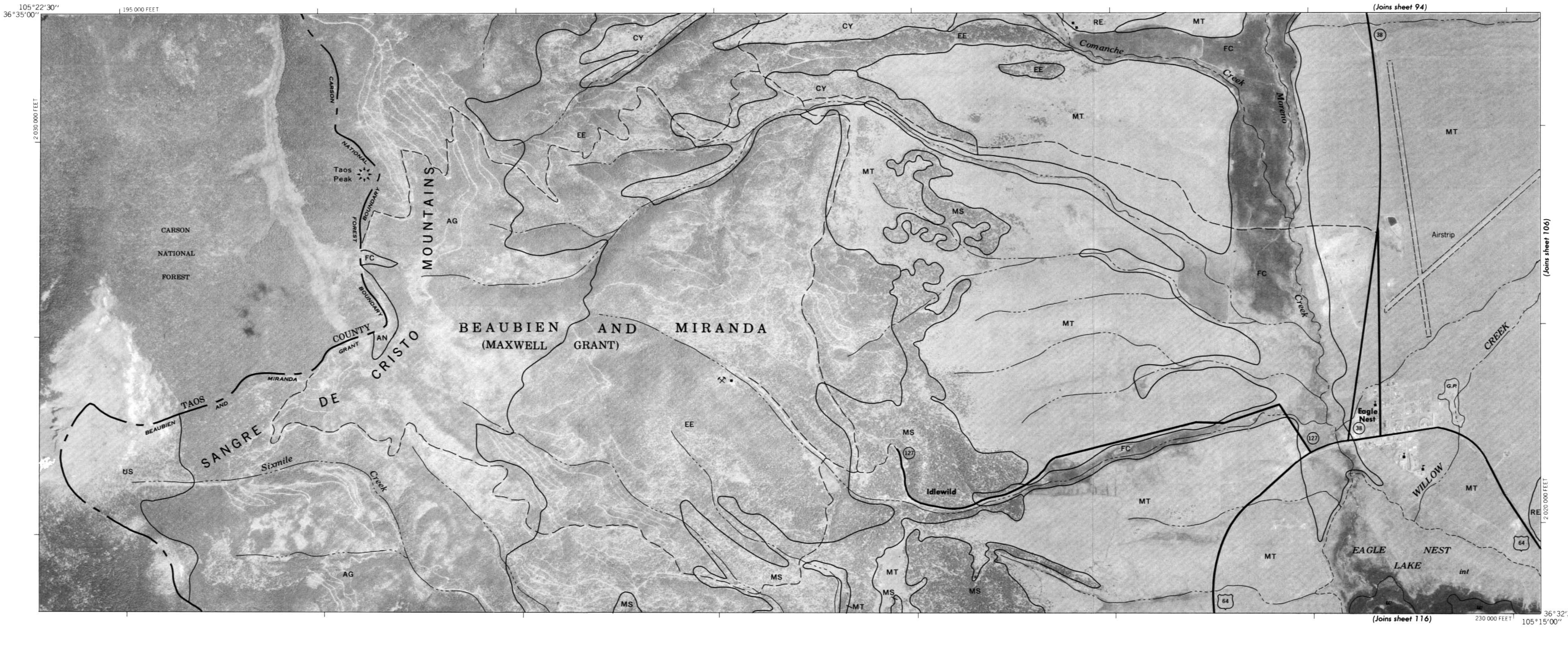
COLFAX COUNTY, NEW MEXICO NO. 104

105

N

COLFAX COUNTY, NEW MEXICO NO. 105

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 106

1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

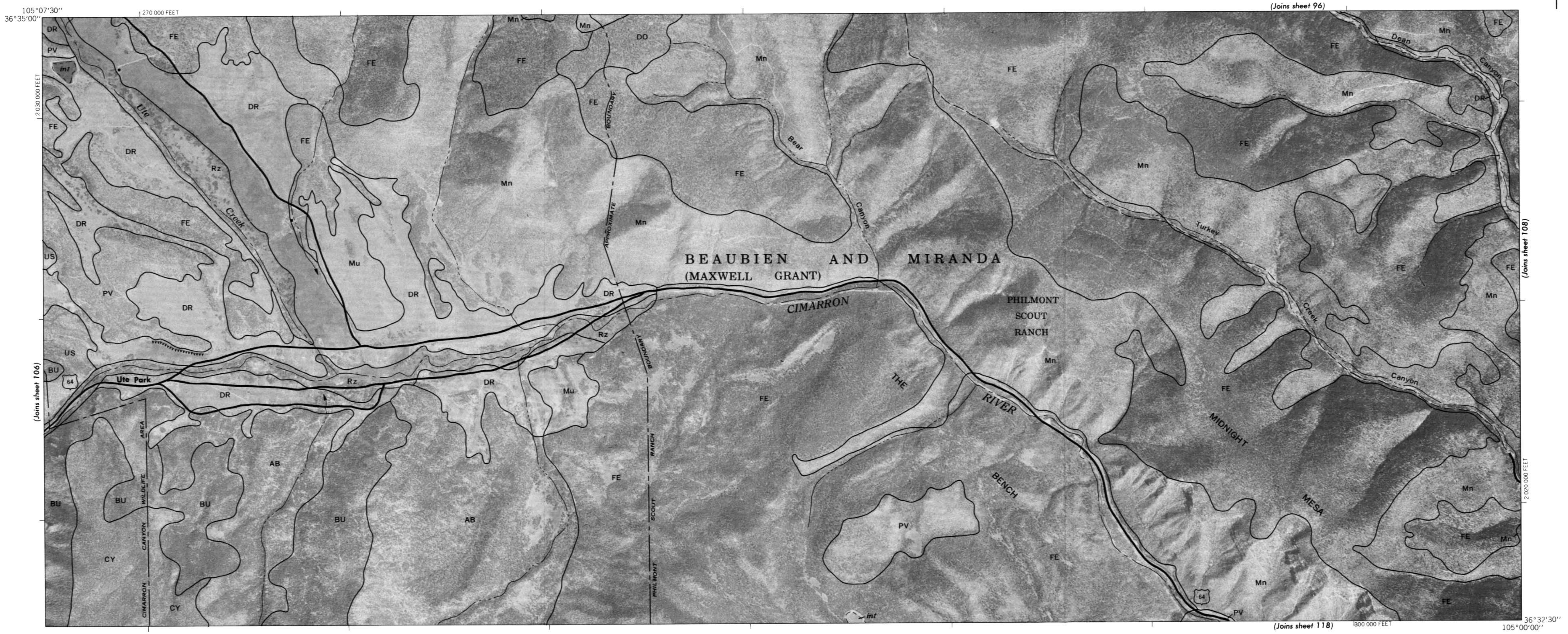
COLFAX COUNTY, NEW MEXICO NO. 106

107

N

COLFAX COUNTY, NEW MEXICO NO 107

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

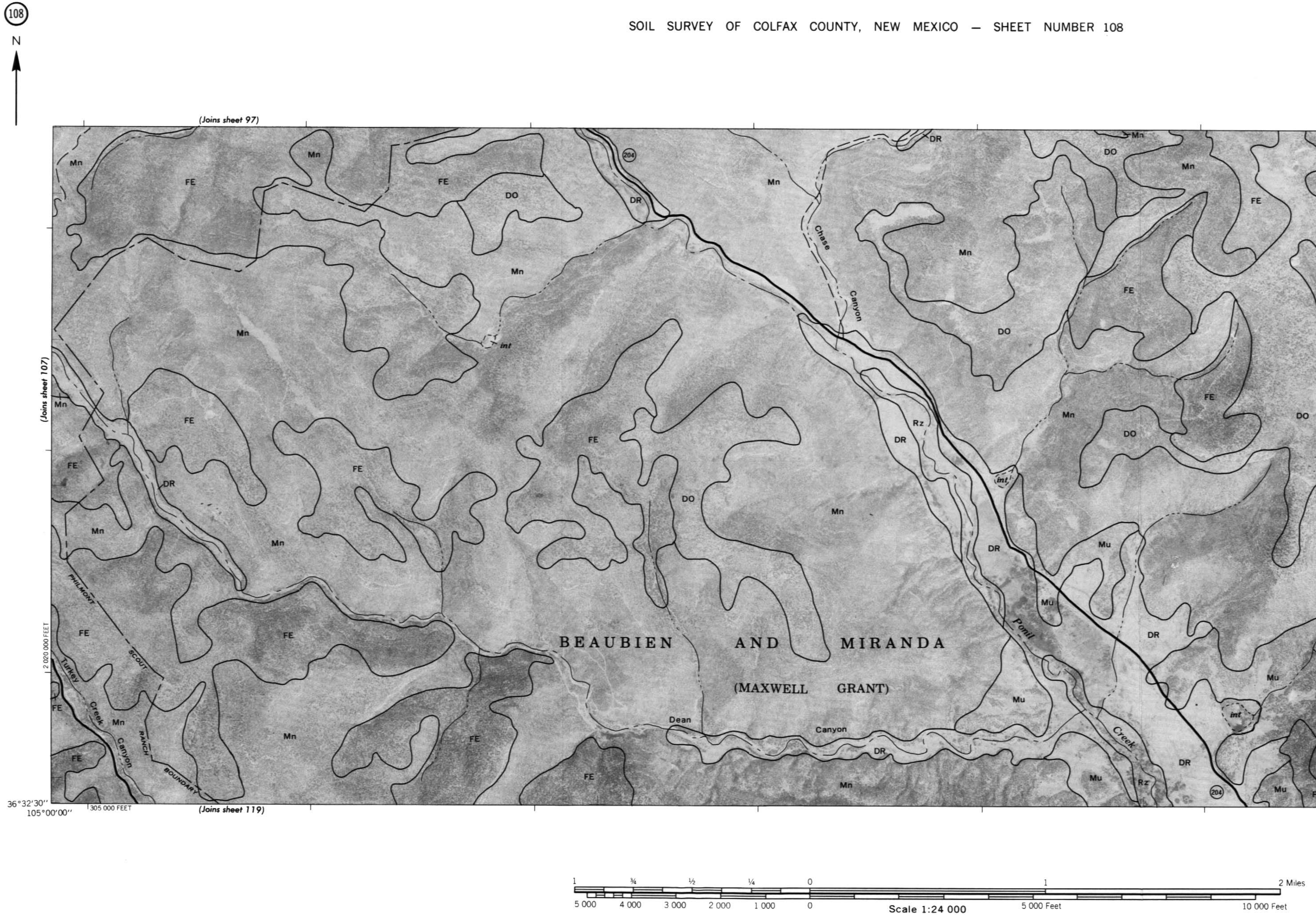


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

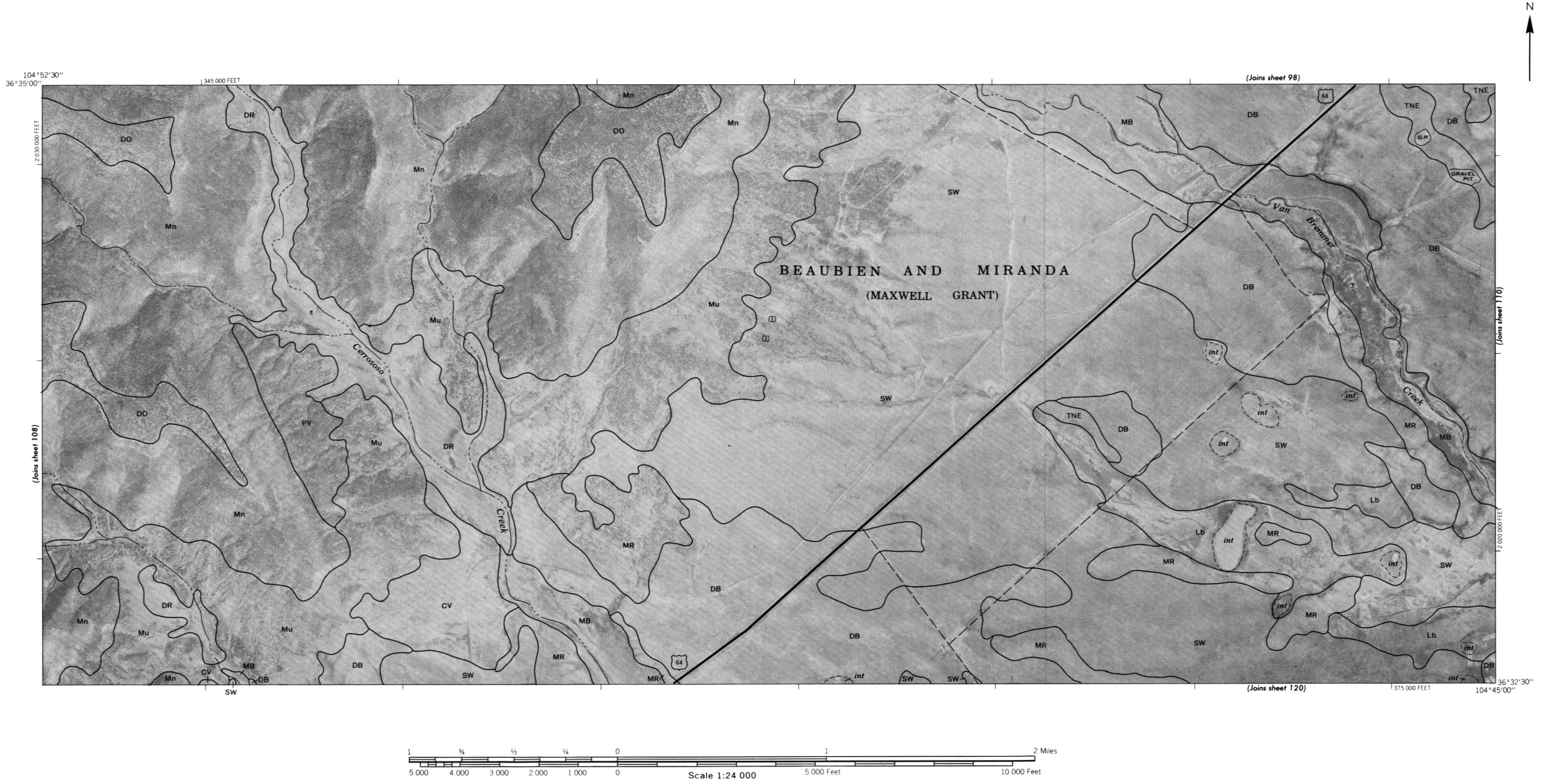
Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 108



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

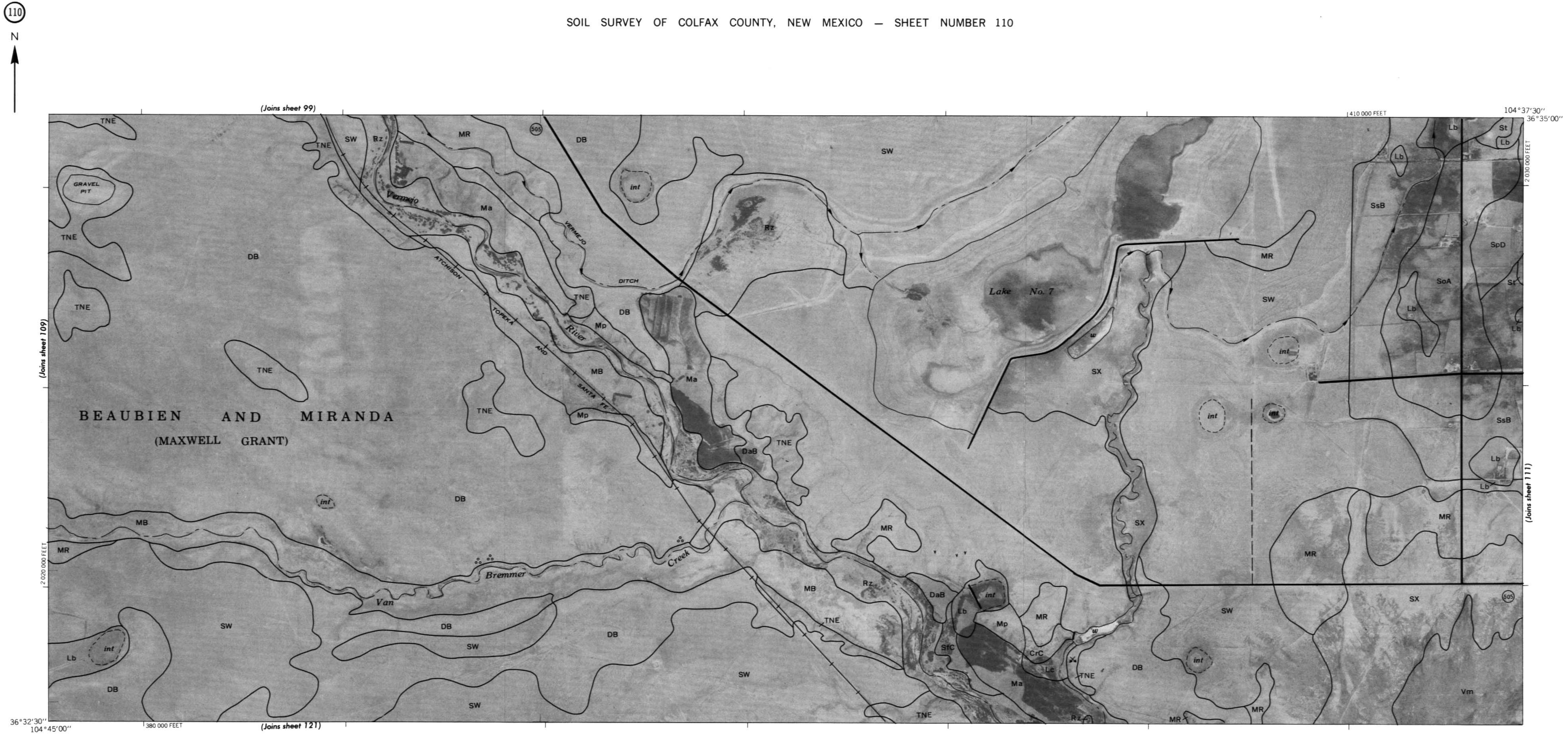
COLFAX COUNTY, NEW MEXICO NO. 108



COLFAX COUNTY, NEW MEXICO NO. 109

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 110



Scale 1:24 000

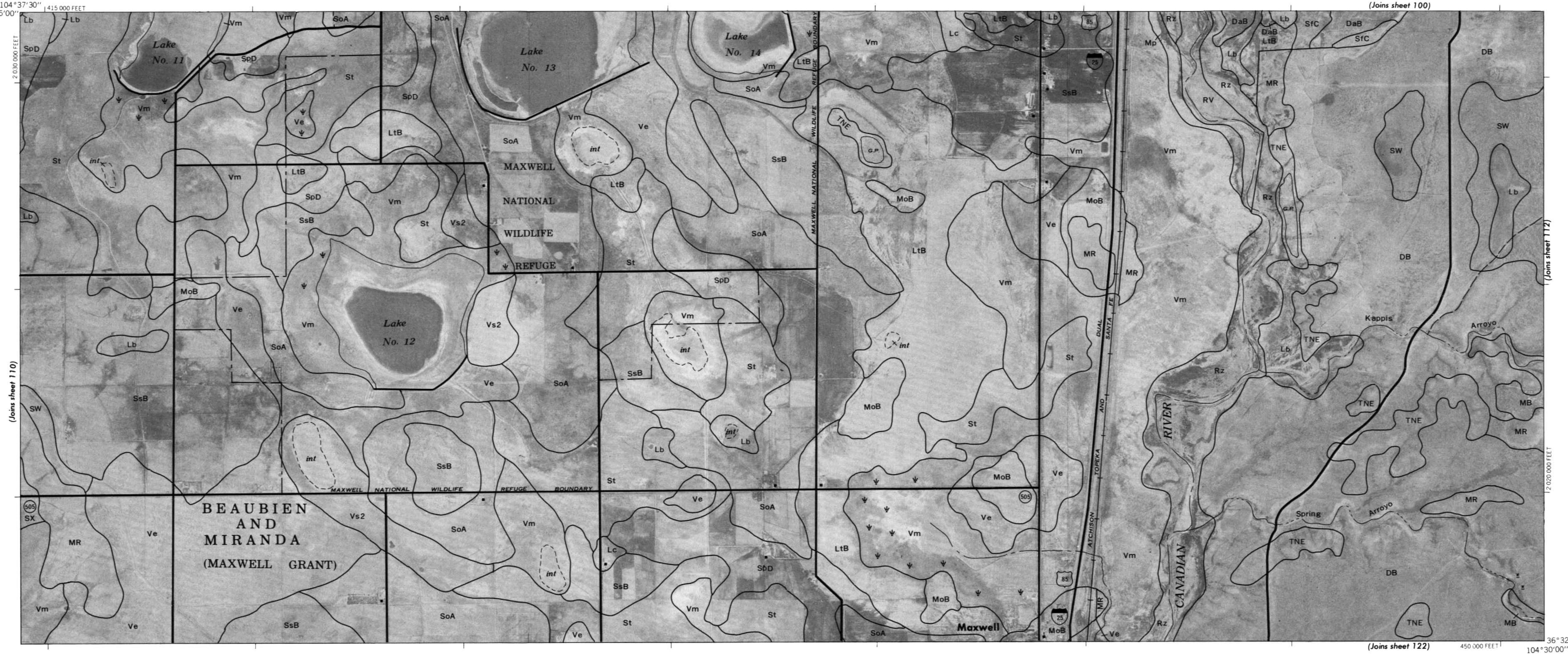
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

111

N



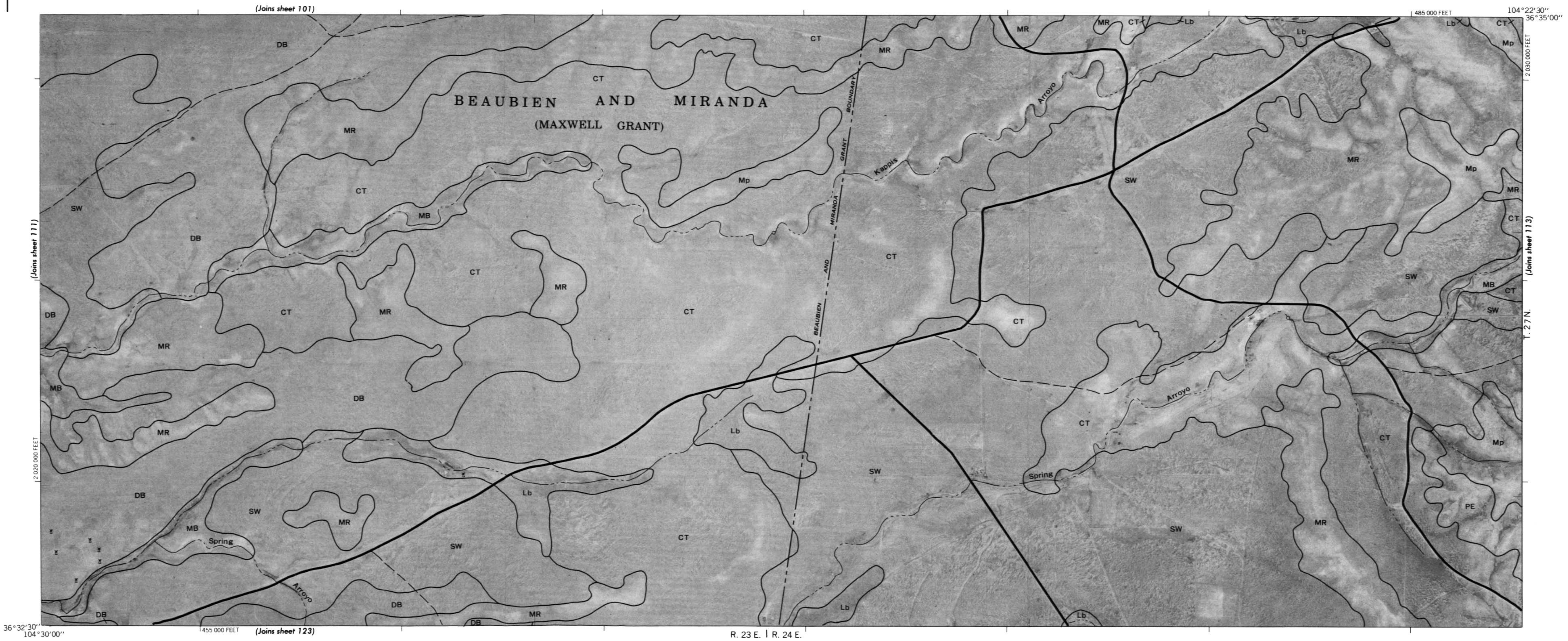
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 112

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 112

113

N

COLFAX COUNTY, NEW MEXICO NO. 113

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

104°22′30″ | 490 000 FEET | R. 24 E. | R. 25 E. | (Joins sheet 102)

36°35′00″

(Joins sheet 112)

2 035 000 FEET

(Joins sheet 114)

T. 27 N.

2 025 000 FEET

36°32′30″

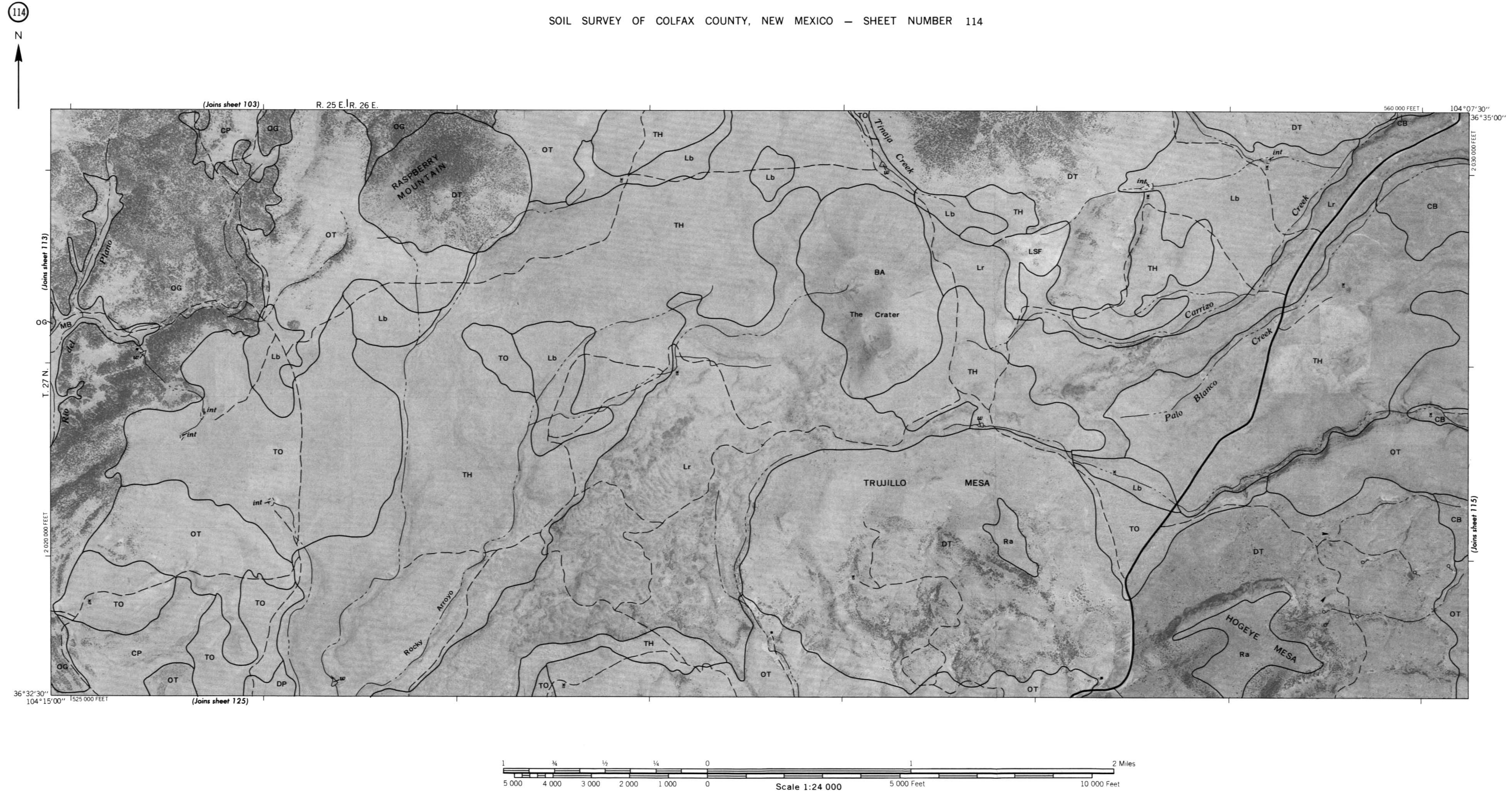
104°15′00″

(Joins sheet 124) | 520 000 FEET

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000



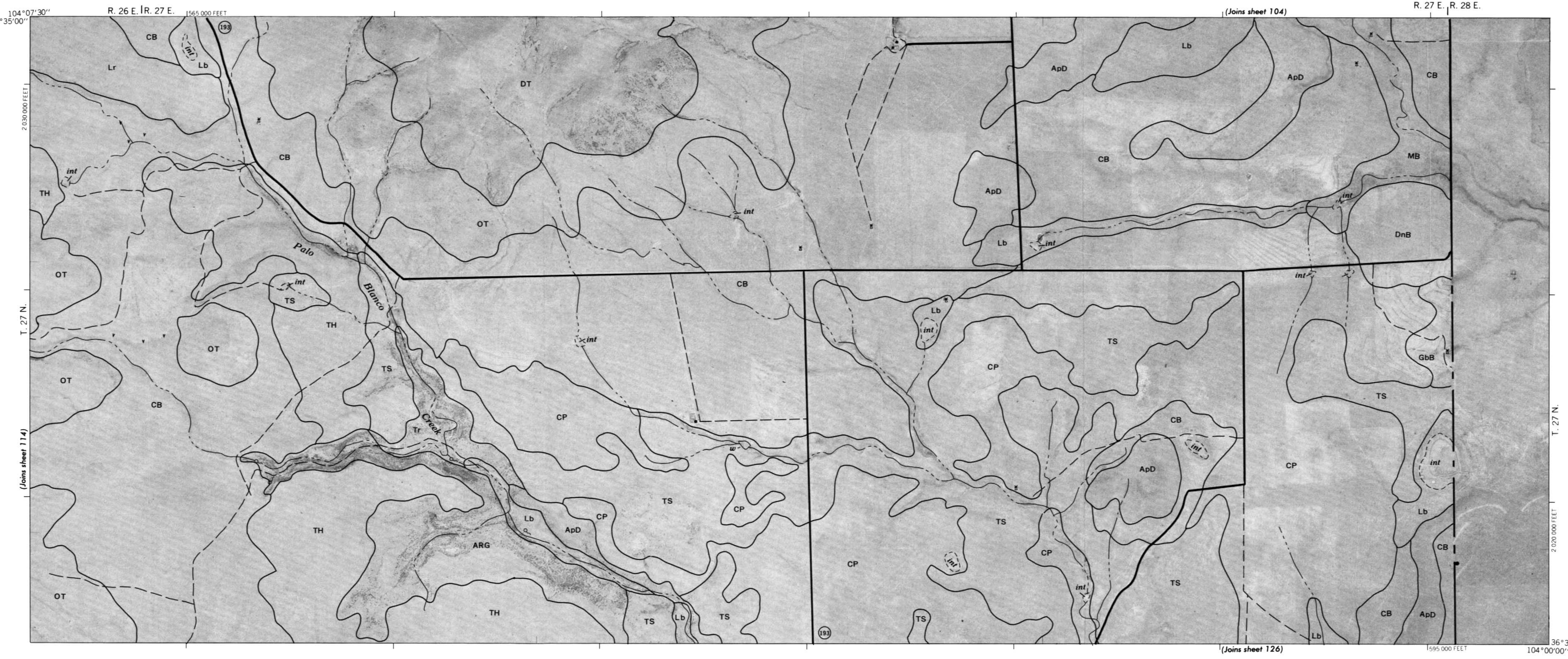
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

115

N

COLFAX COUNTY, NEW MEXICO NO. 115

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

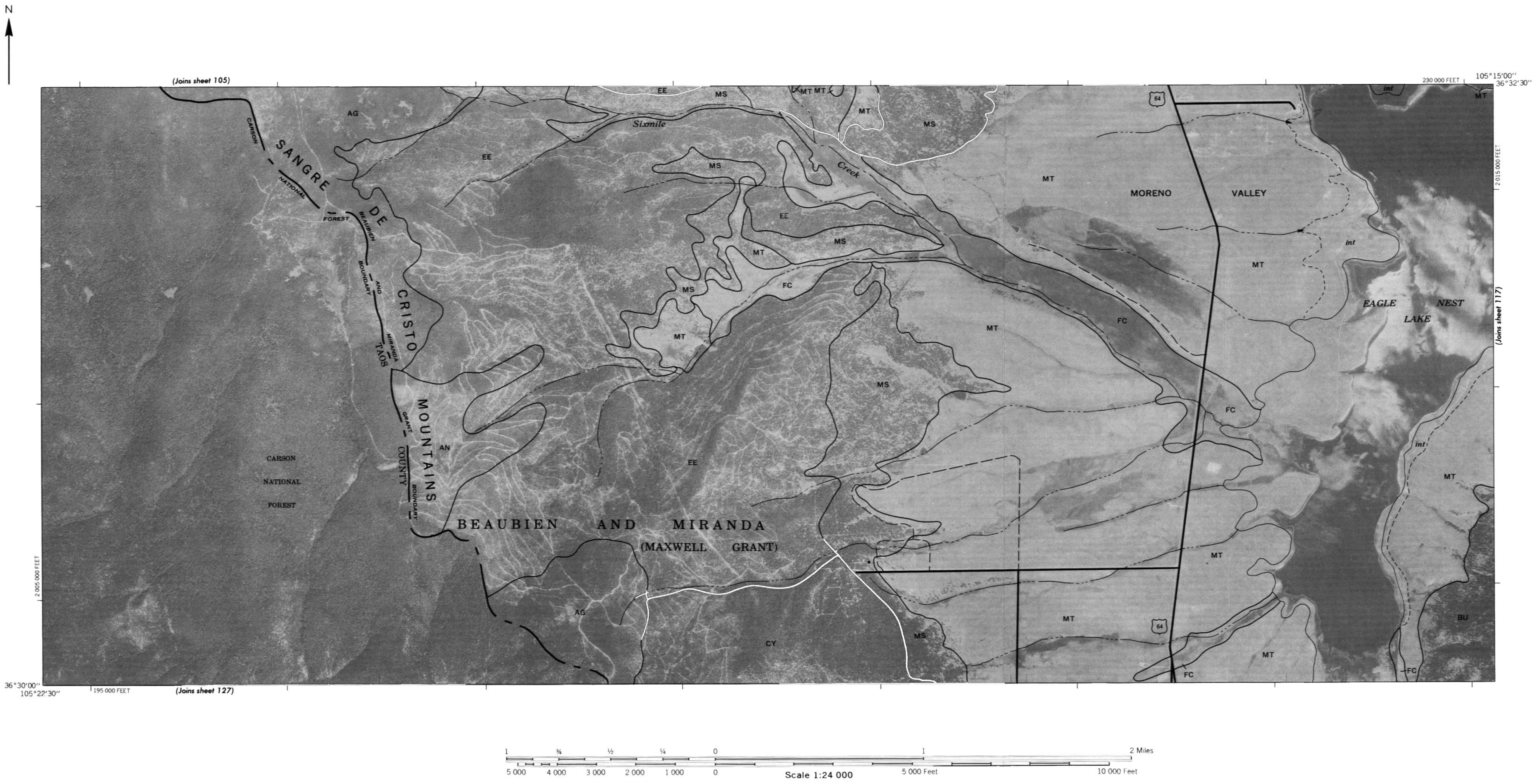


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 116



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 116

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

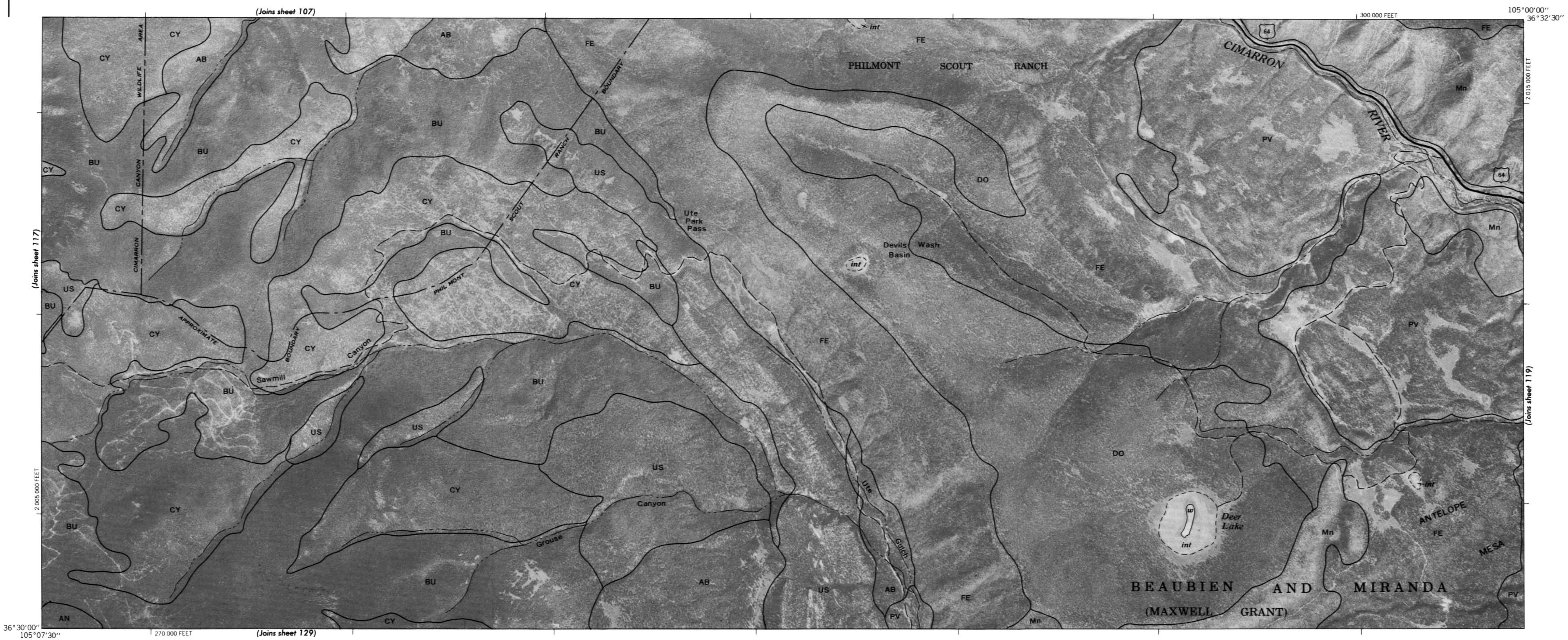
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 117

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 118

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

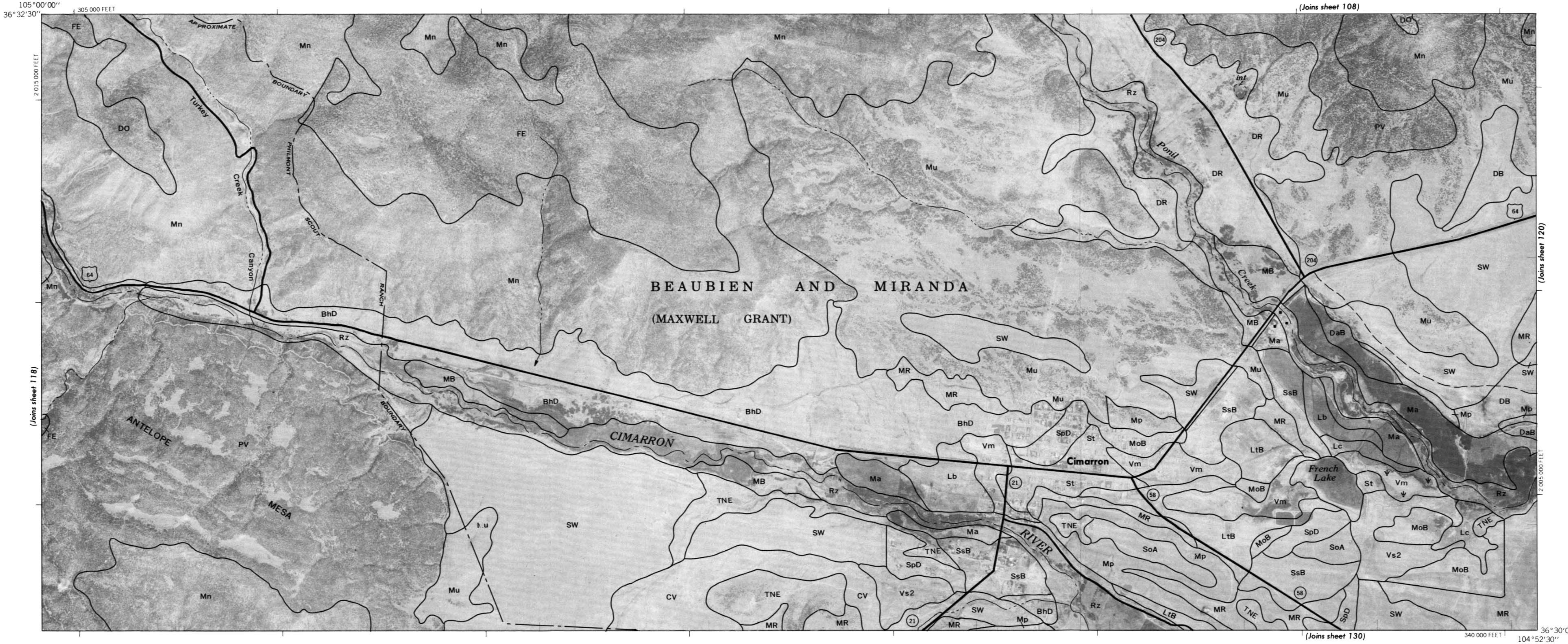
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

119

N

COLFAX COUNTY, NEW MEXICO NO. 119

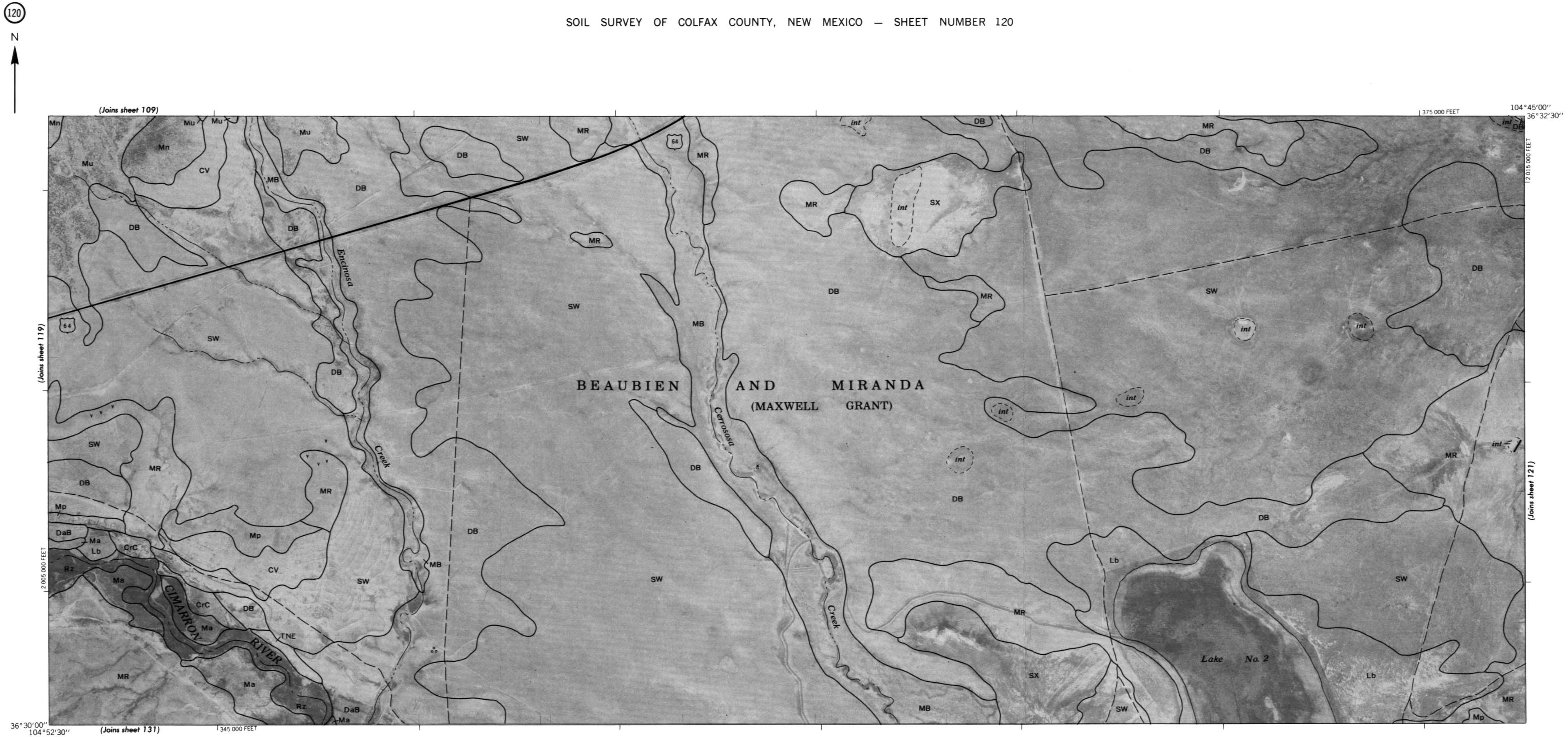
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

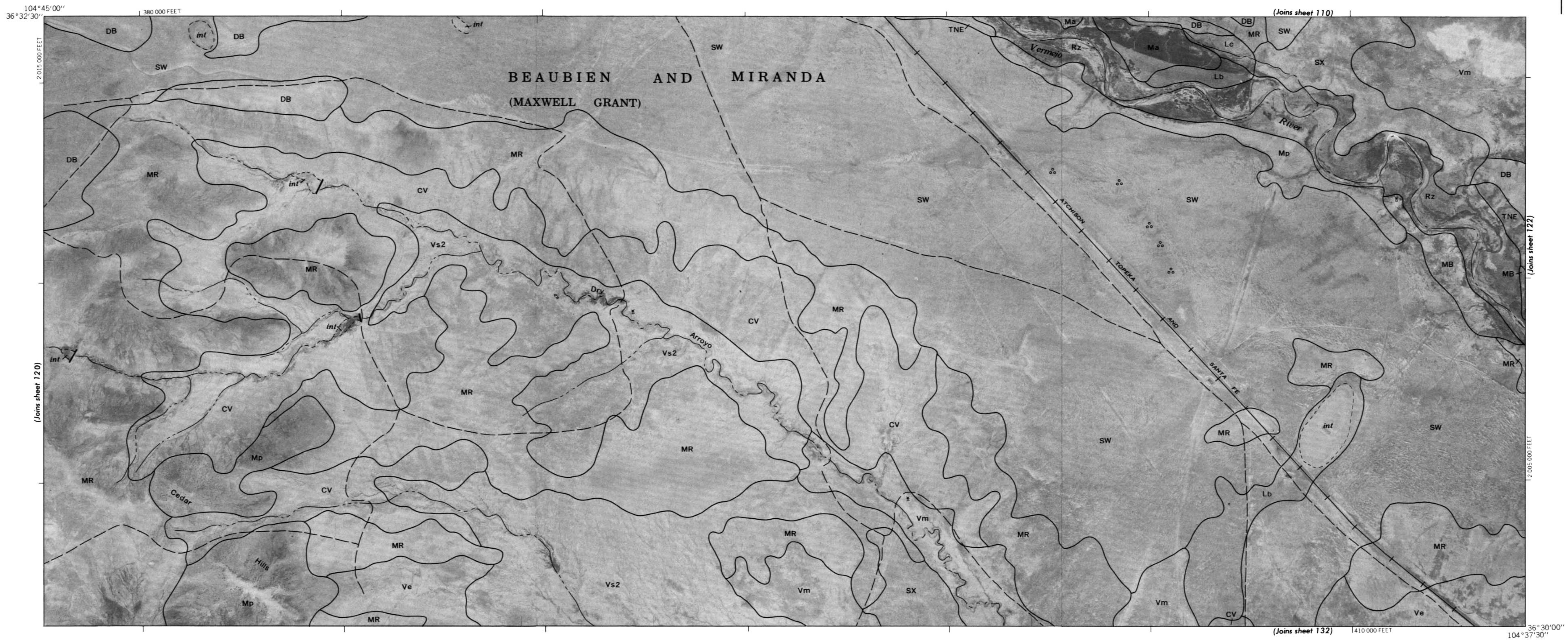
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

COLFAX COUNTY, NEW MEXICO NO. 121

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

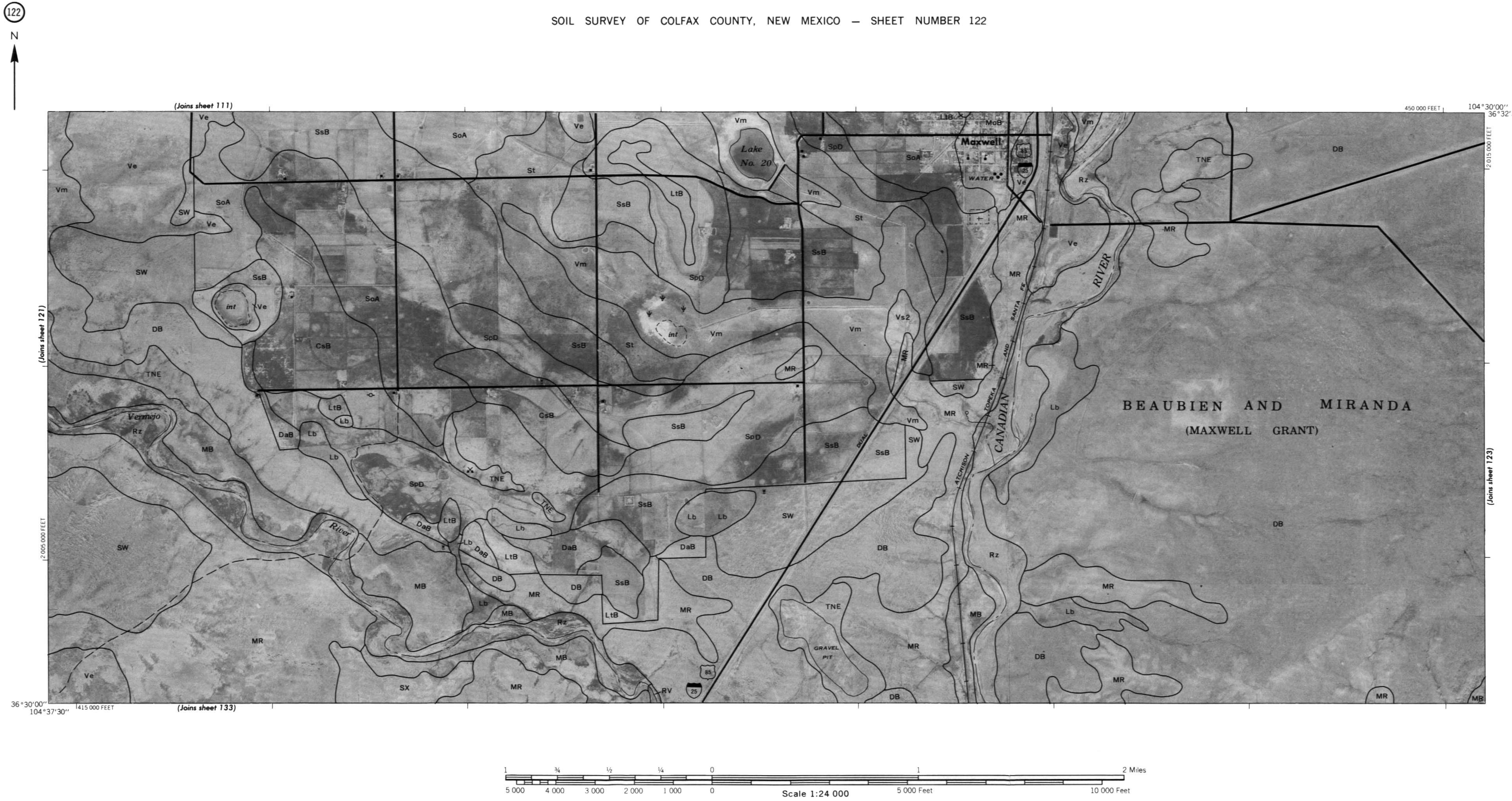


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

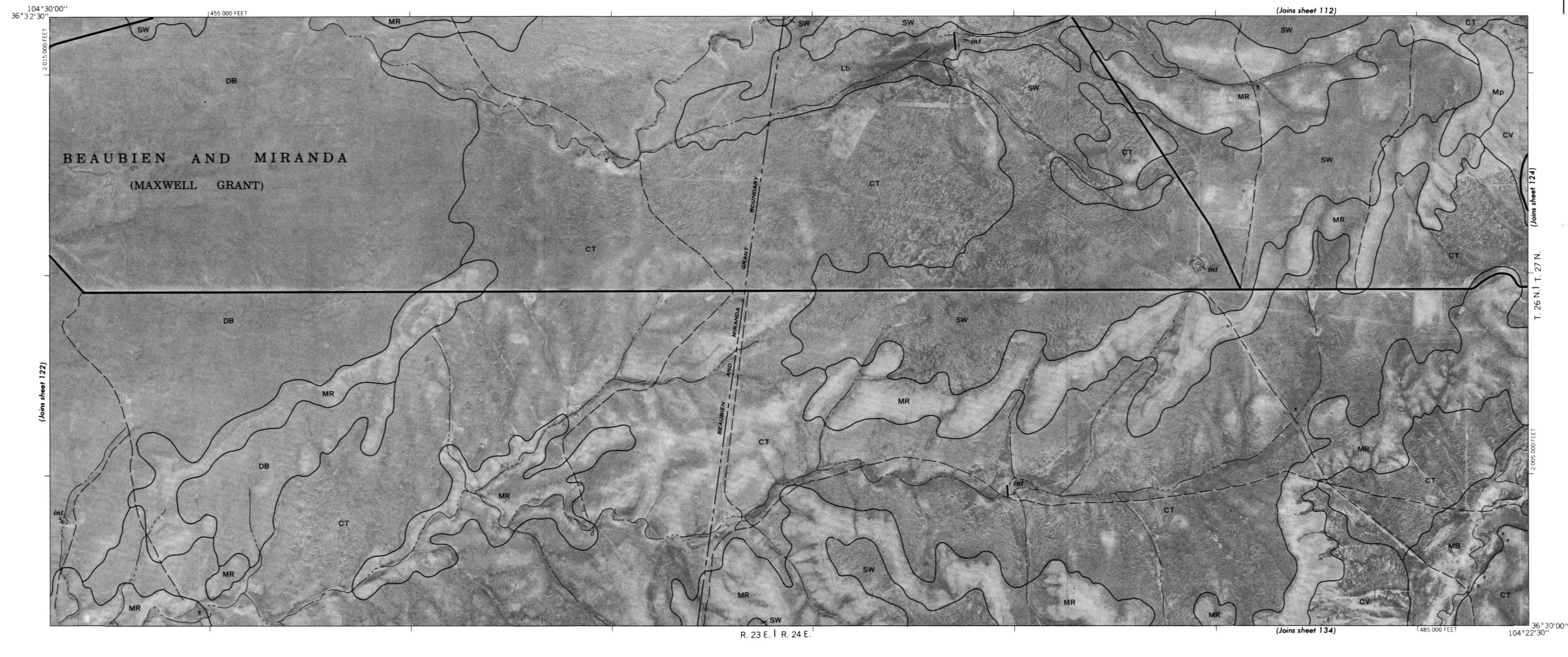
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 122



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 123

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



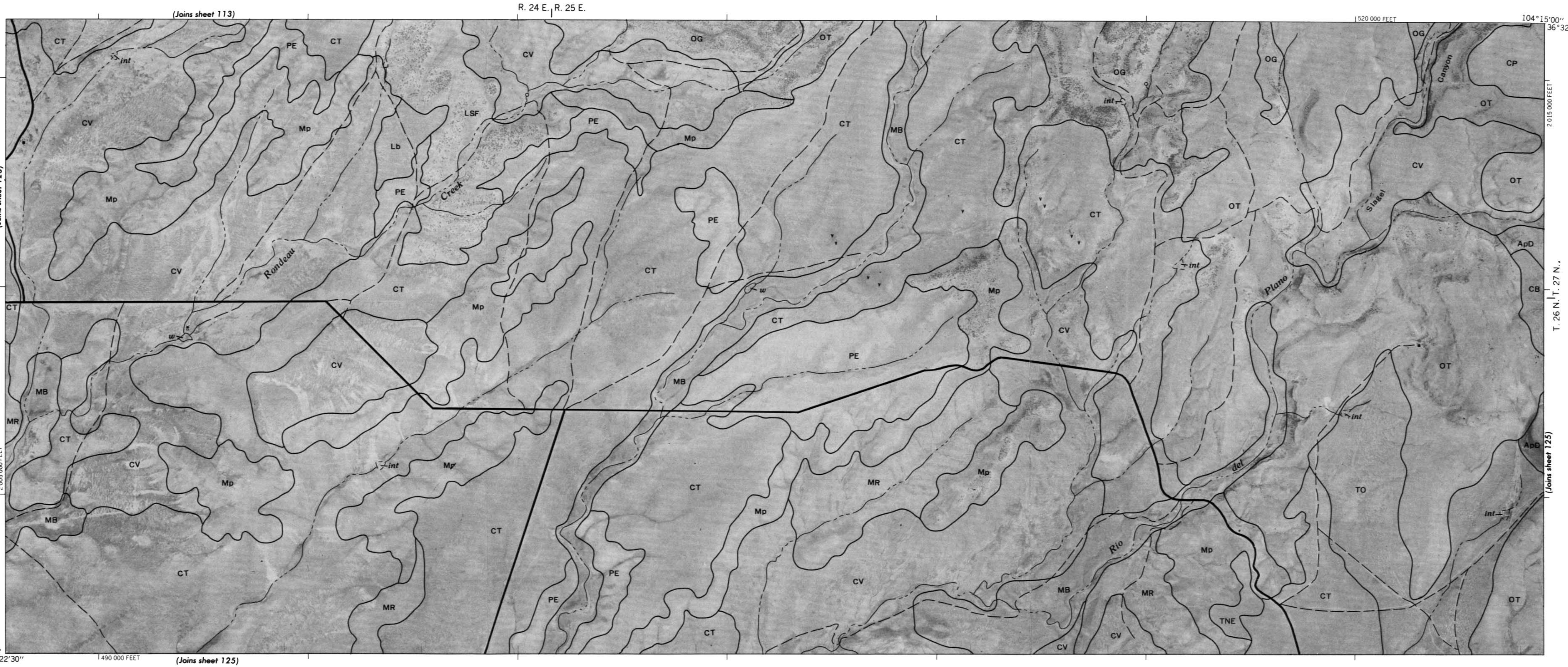
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 124



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

125

COLFAX COUNTY, NEW MEXICO NO. 125

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 126

N

R. 26 E. | R. 27 E. (Joins sheet 115) 595 000 FEET R. 27 E. | R. 28 E. 104°00′00″ 36°32′30″

36°30′00″ 104°07′30″ 565 000 FEET (Joins sheet 137)

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

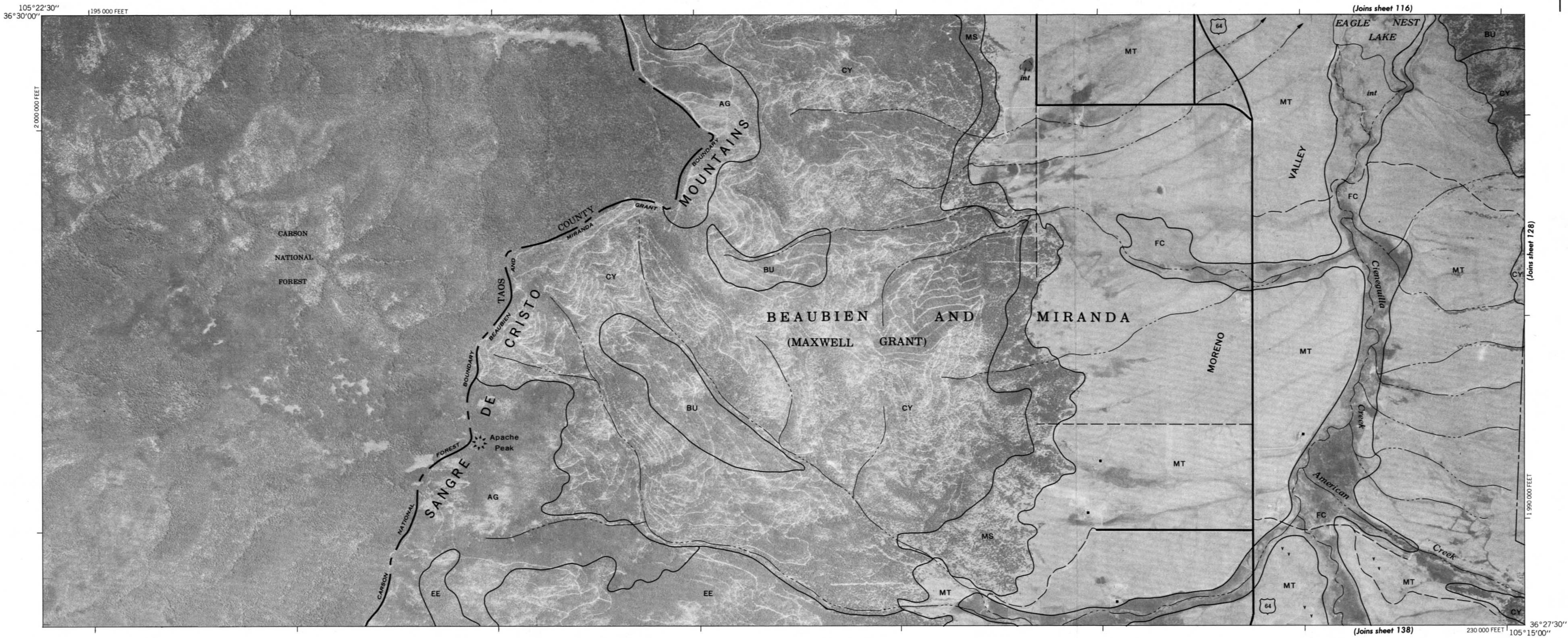
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 126

N

COLFAX COUNTY, NEW MEXICO NO. 127

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



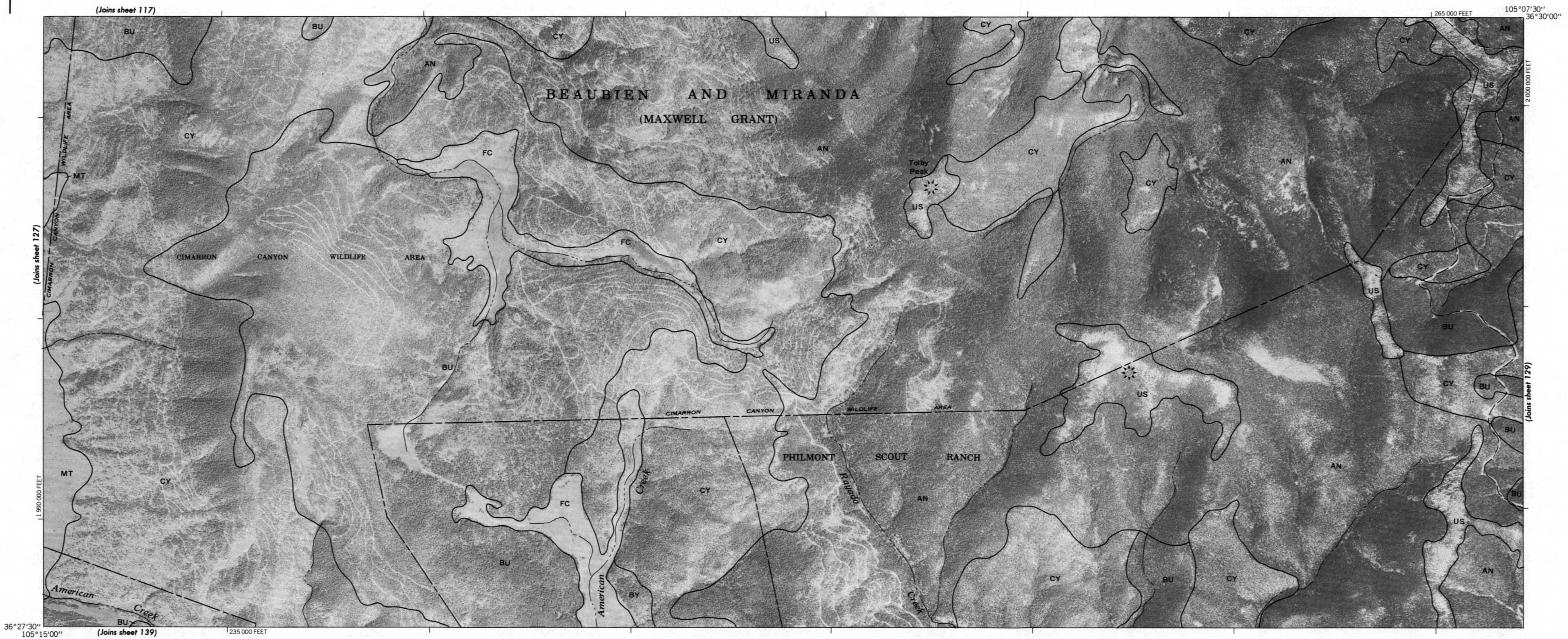
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 128

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

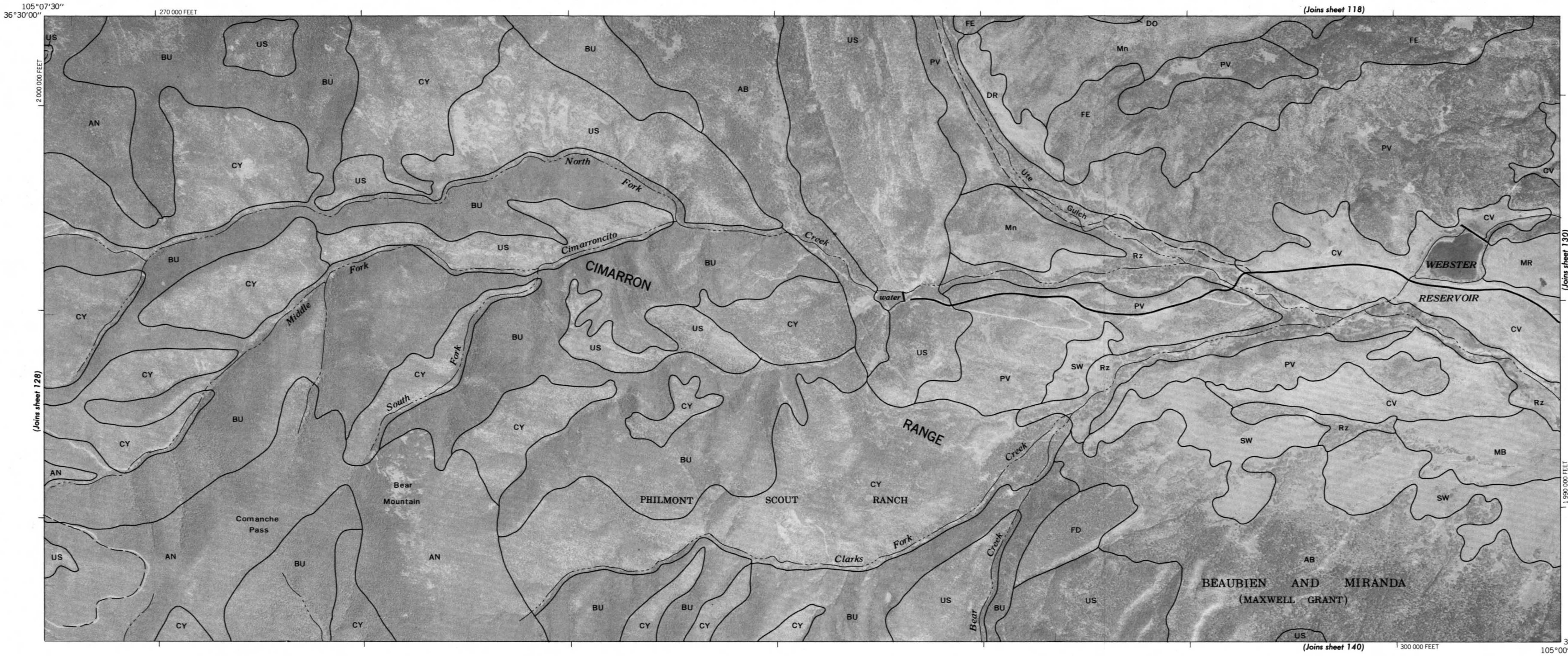
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 128

N

COLFAX COUNTY, NEW MEXICO NO. 129

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



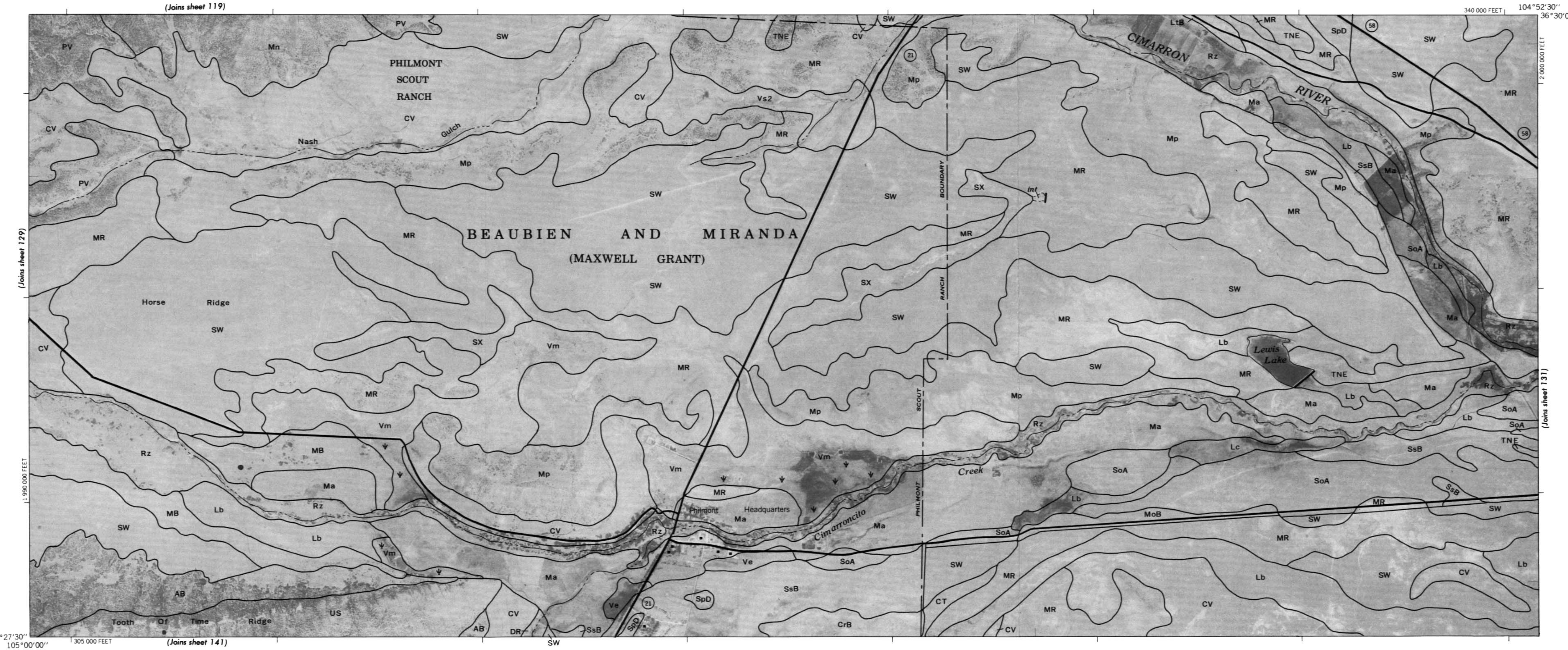
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 130

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

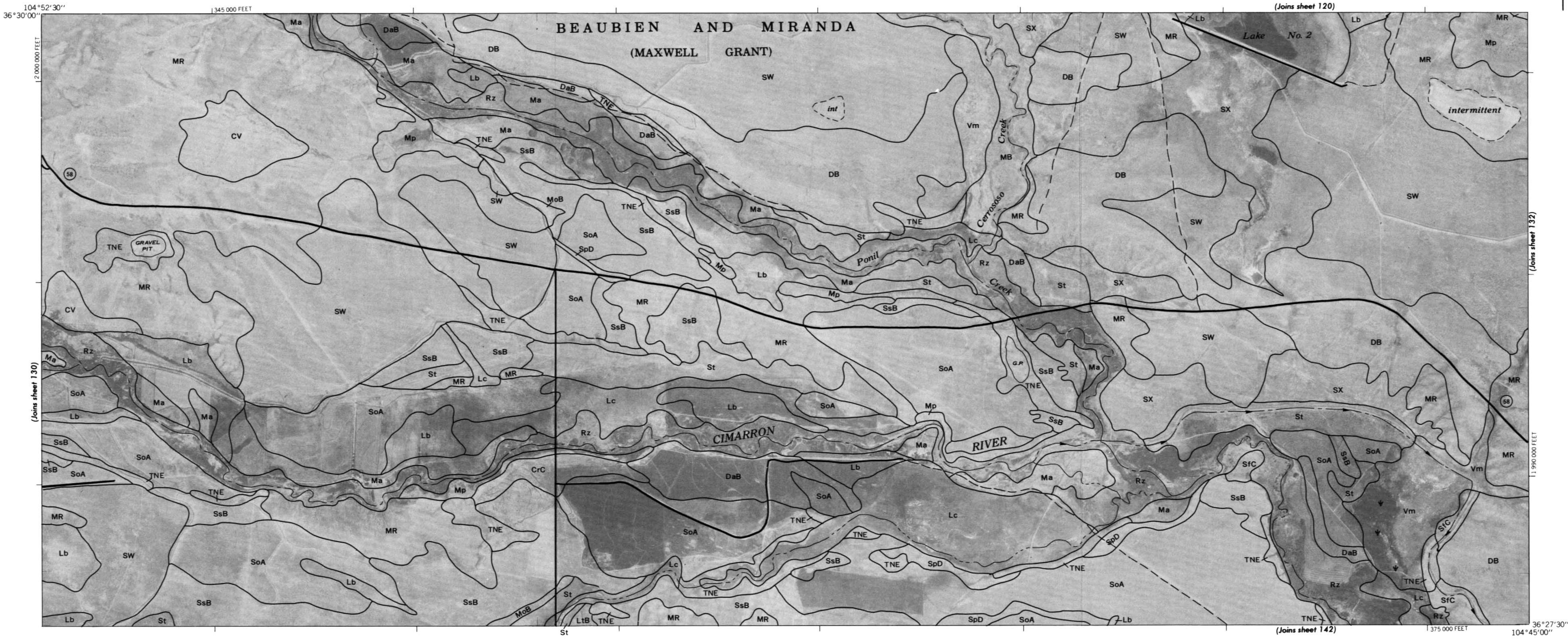
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 130

N

COLFAX COUNTY, NEW MEXICO NO. 131

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

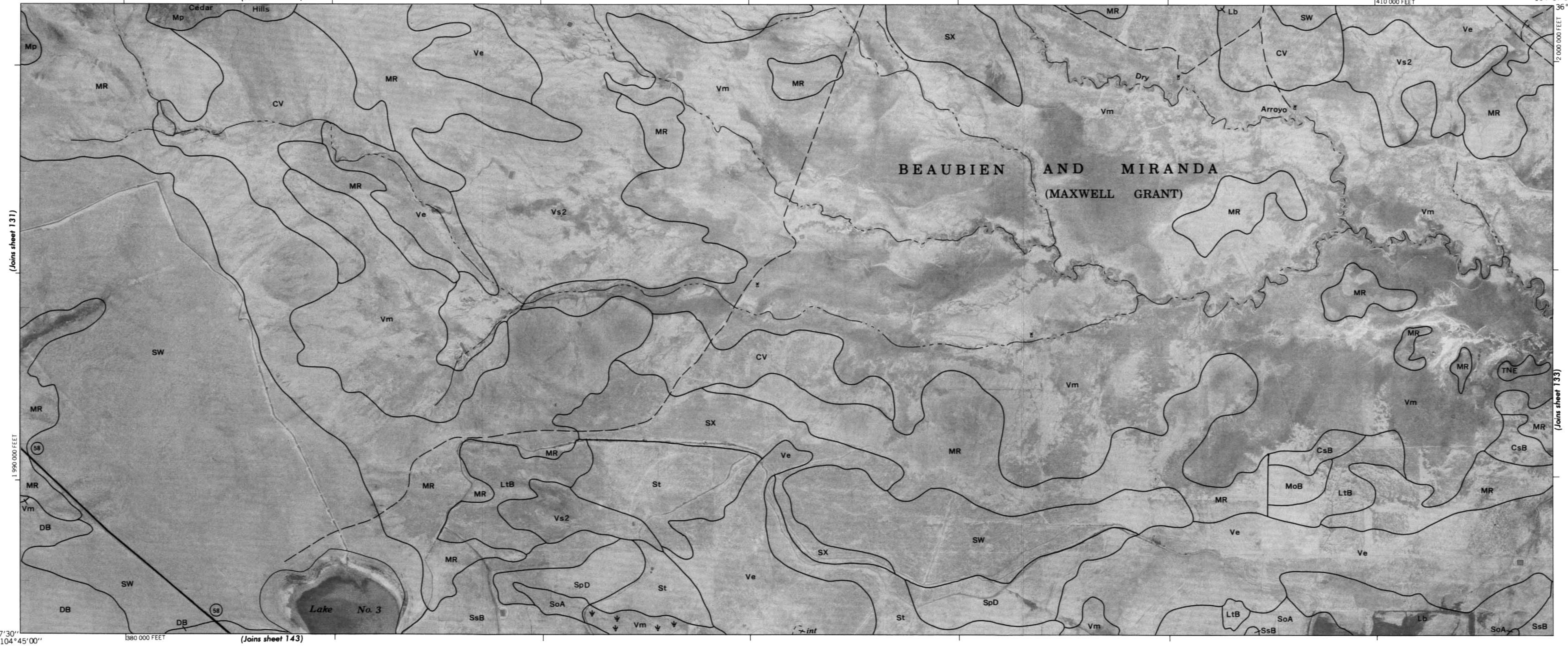
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 132

N

(Joins sheet 121)



(Joins sheet 143)

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

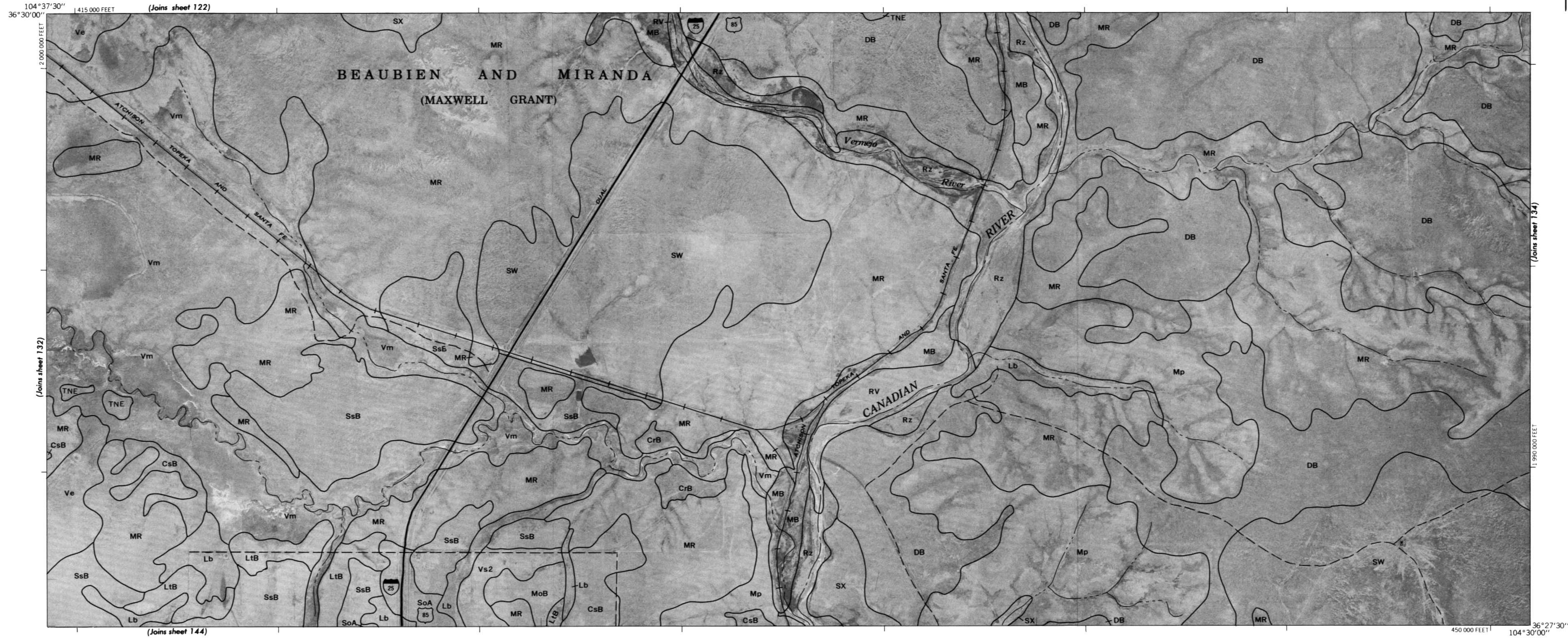
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

133

N

COLFAX COUNTY, NEW MEXICO NO. 133

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

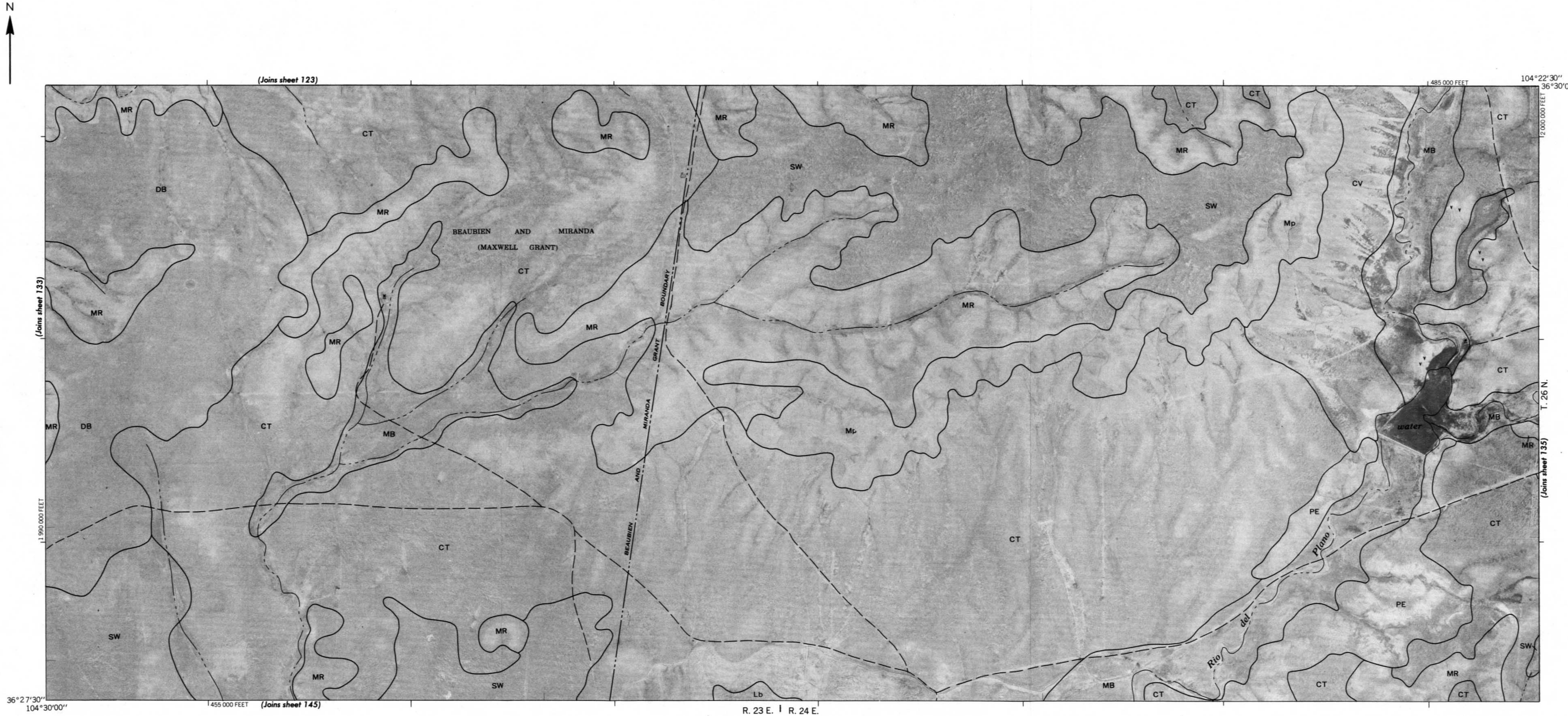


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 134



1 ¾ ½ ¼ 0 1 2 Miles

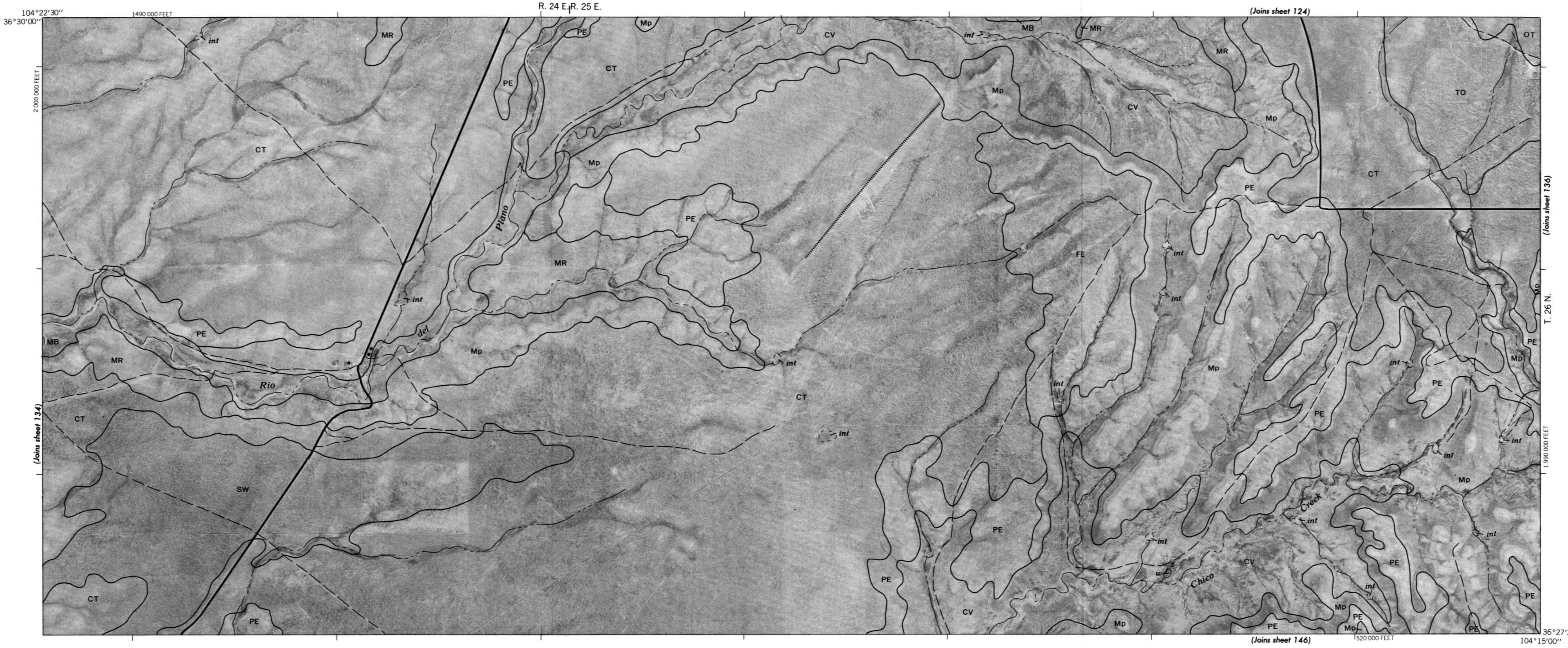
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

135

N



1 ¾ ½ ¼ 0 1 2 Miles

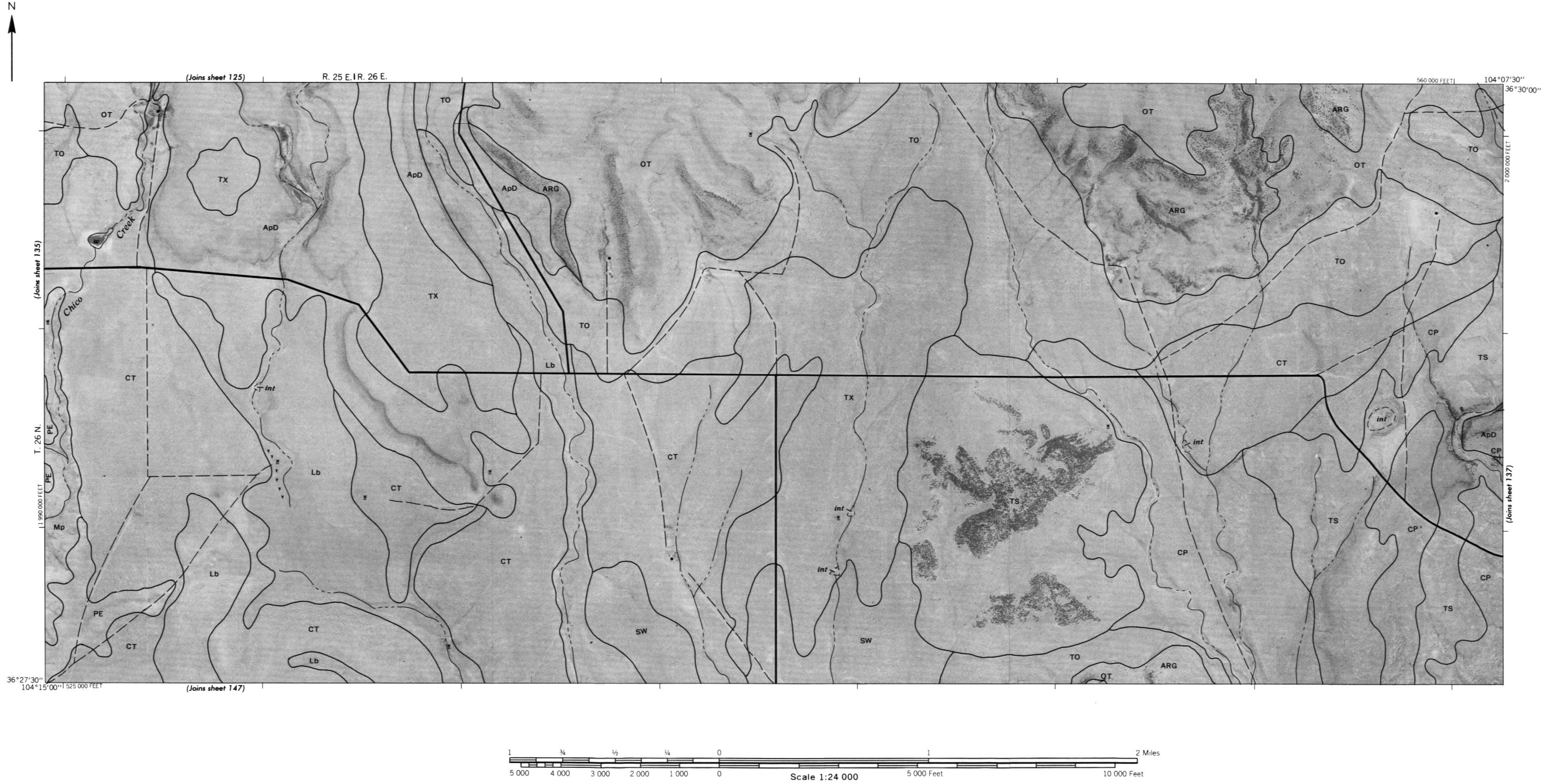
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 135

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 136



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

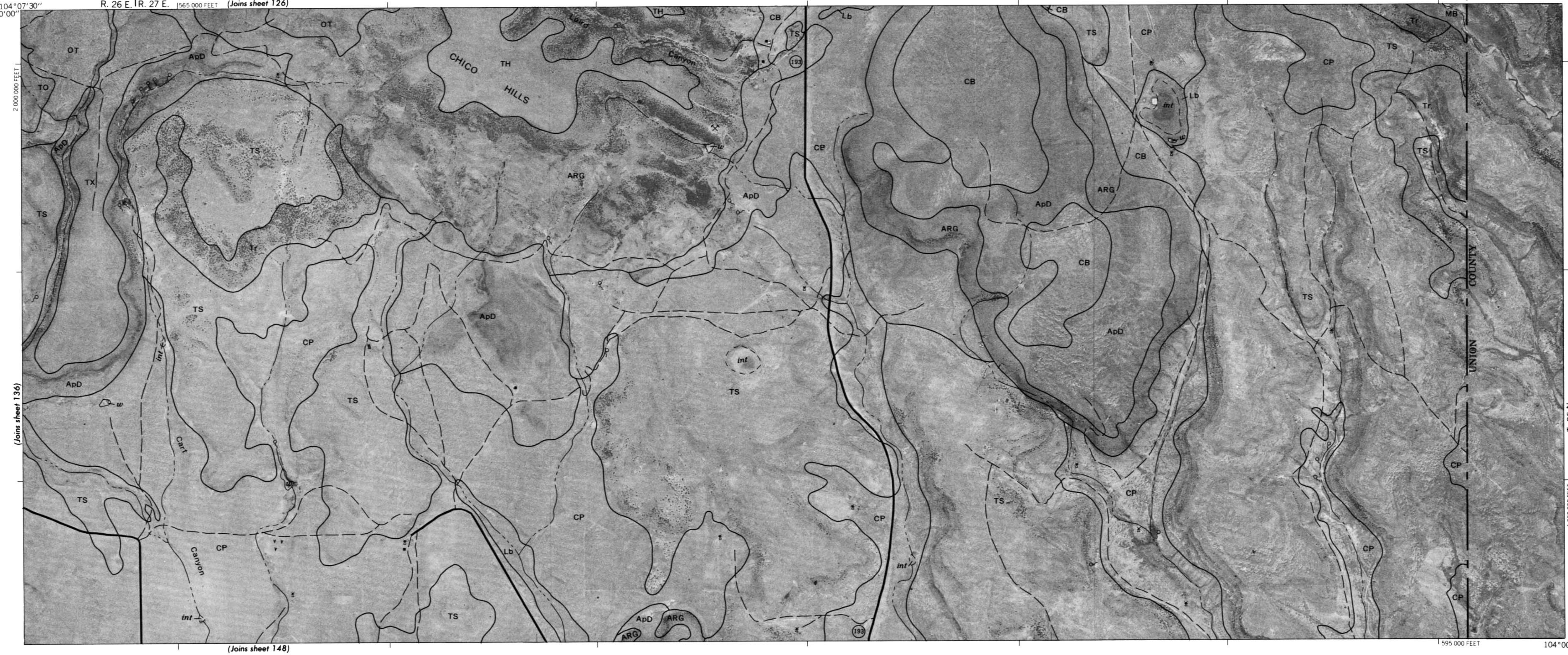
COLFAX COUNTY, NEW MEXICO NO. 136

N

COLFAX COUNTY, NEW MEXICO NO. 137

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

104°07'30" 36°30'00" R. 26 E. R. 27 E. 565 000 FEET (Joins sheet 126) R. 27 E. R. 28 E.



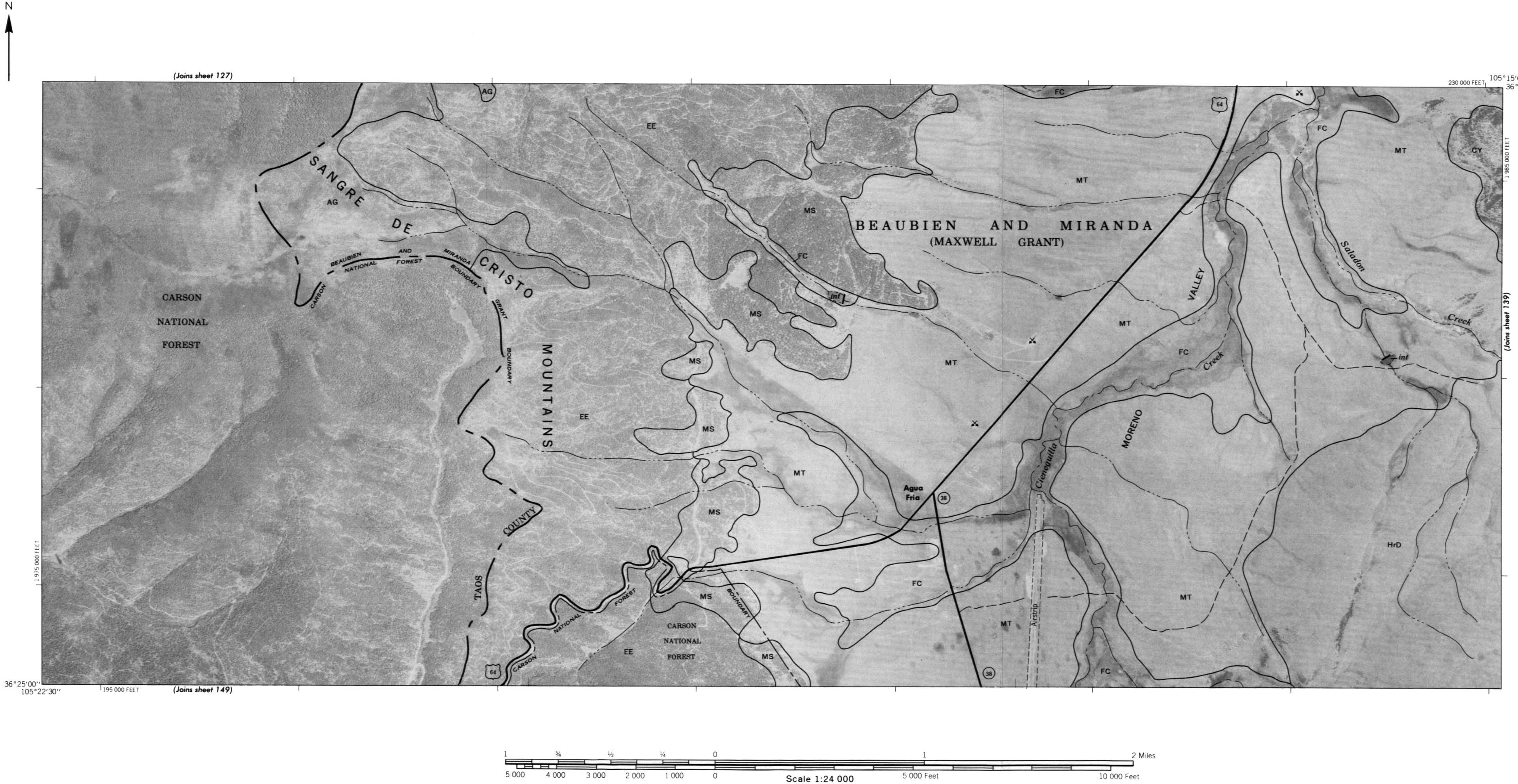
2 000 000 FEET (Joins sheet 136) T. 26 N. 1 990 000 FEET (Joins sheet 148) 595 000 FEET 36°27'30" 104°00'00"

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 138

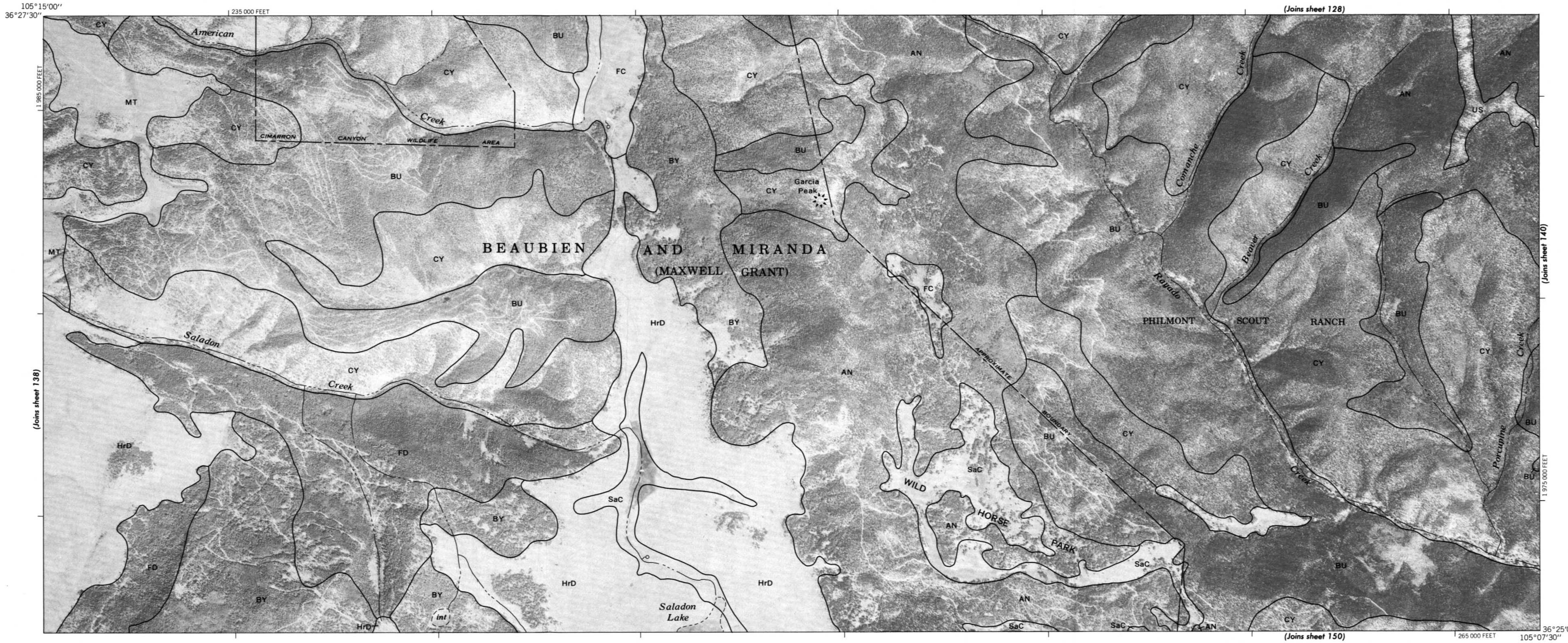


Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

COLFAX COUNTY, NEW MEXICO NO. 139

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 140

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

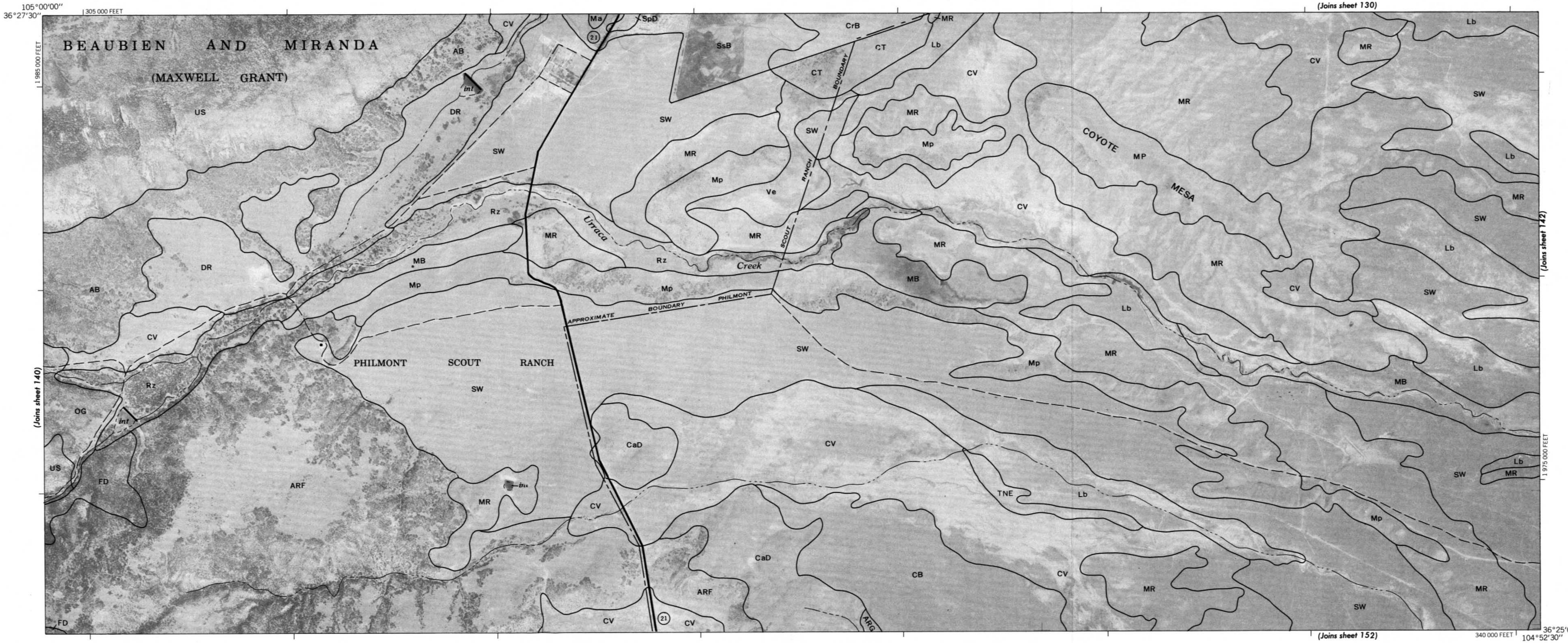
COLFAX COUNTY, NEW MEXICO NO. 140

141

N

COLFAX COUNTY, NEW MEXICO NO. 141

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

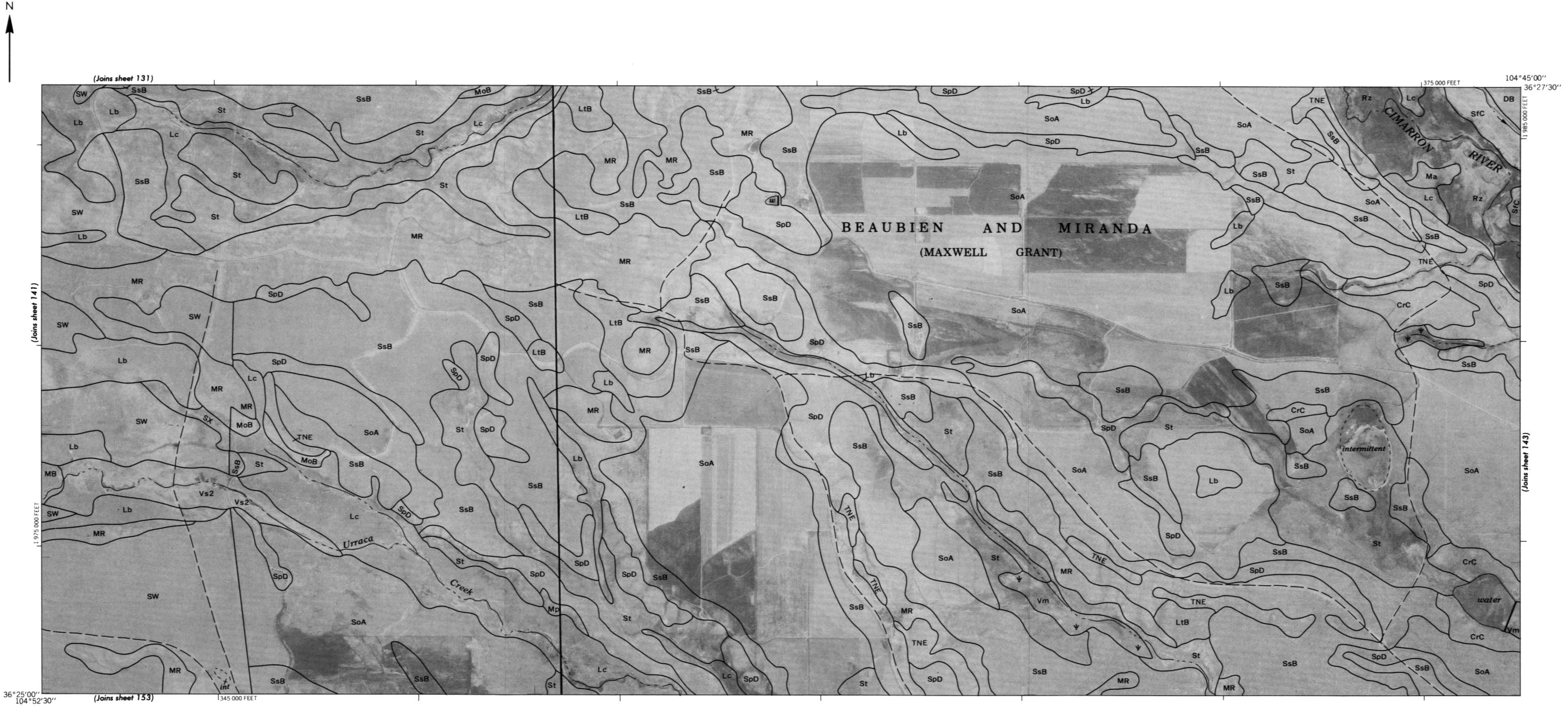


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 142



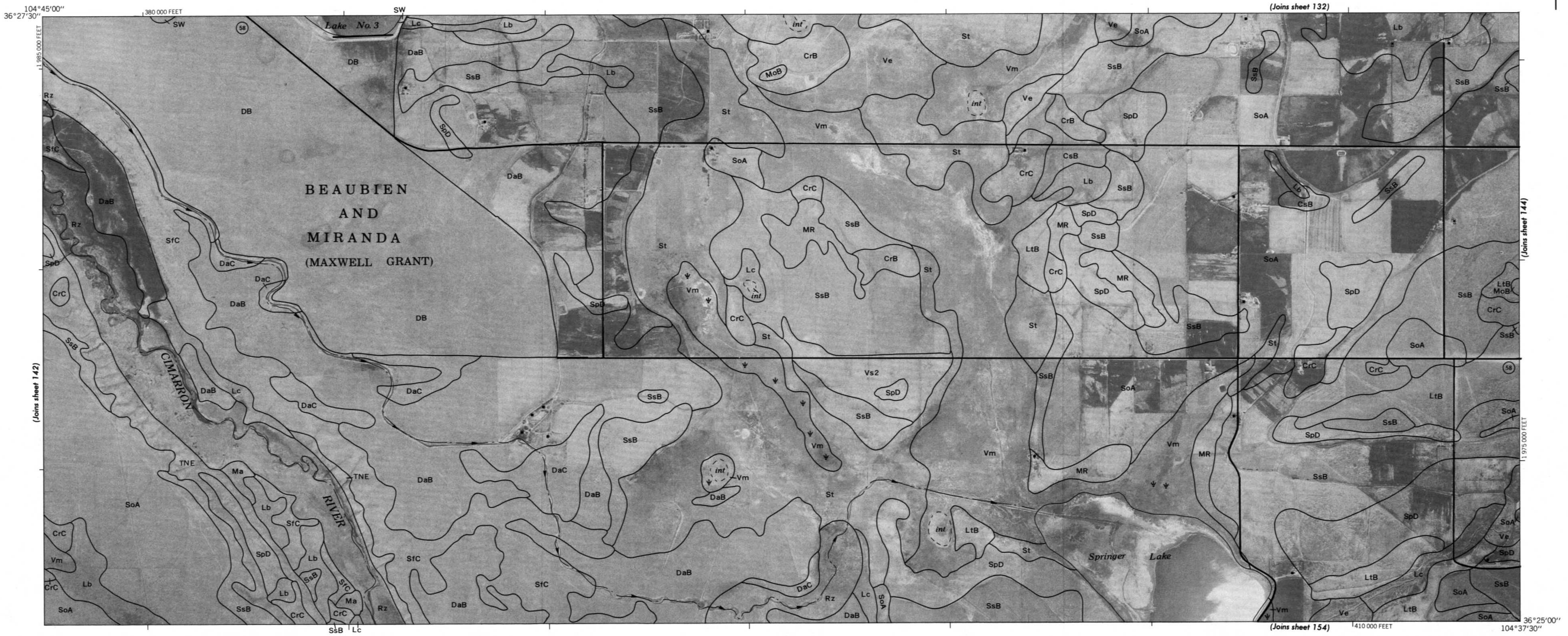
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 142



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

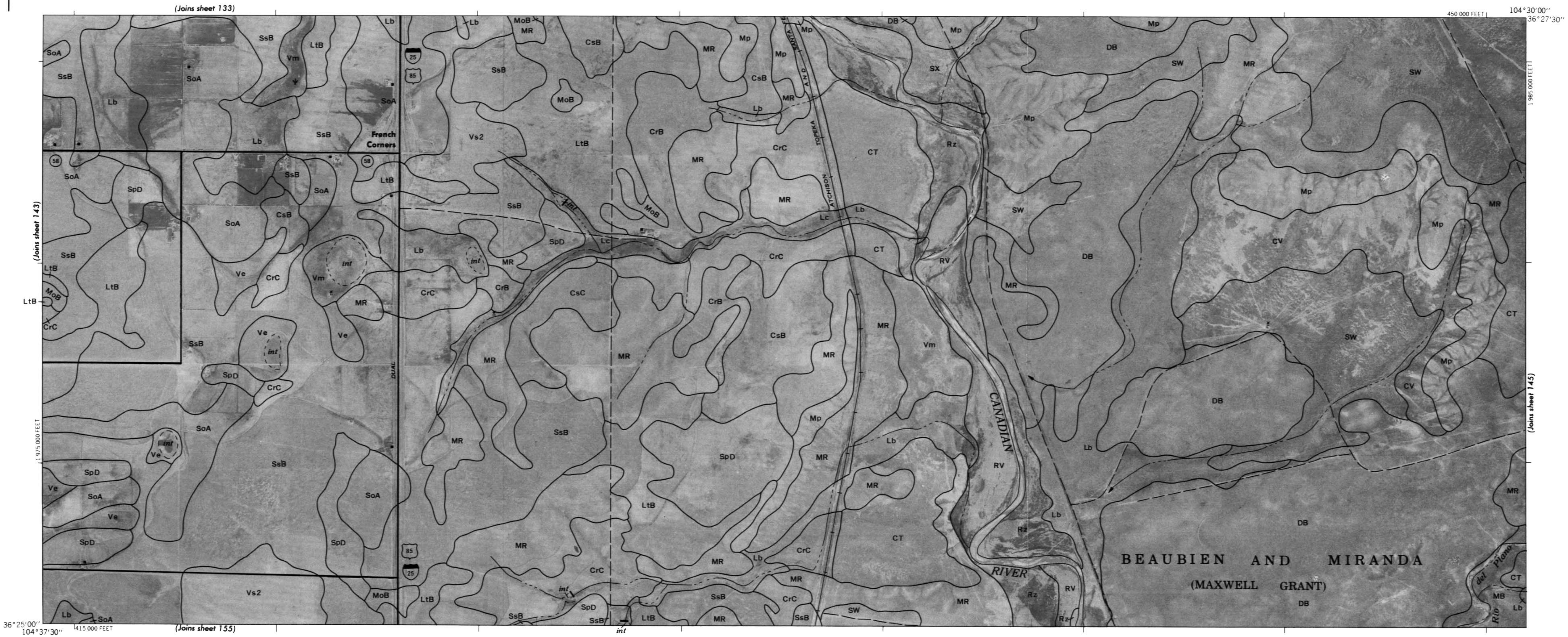
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 143

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 144

N



1 ¾ ½ ¼ 0 1 2 Miles

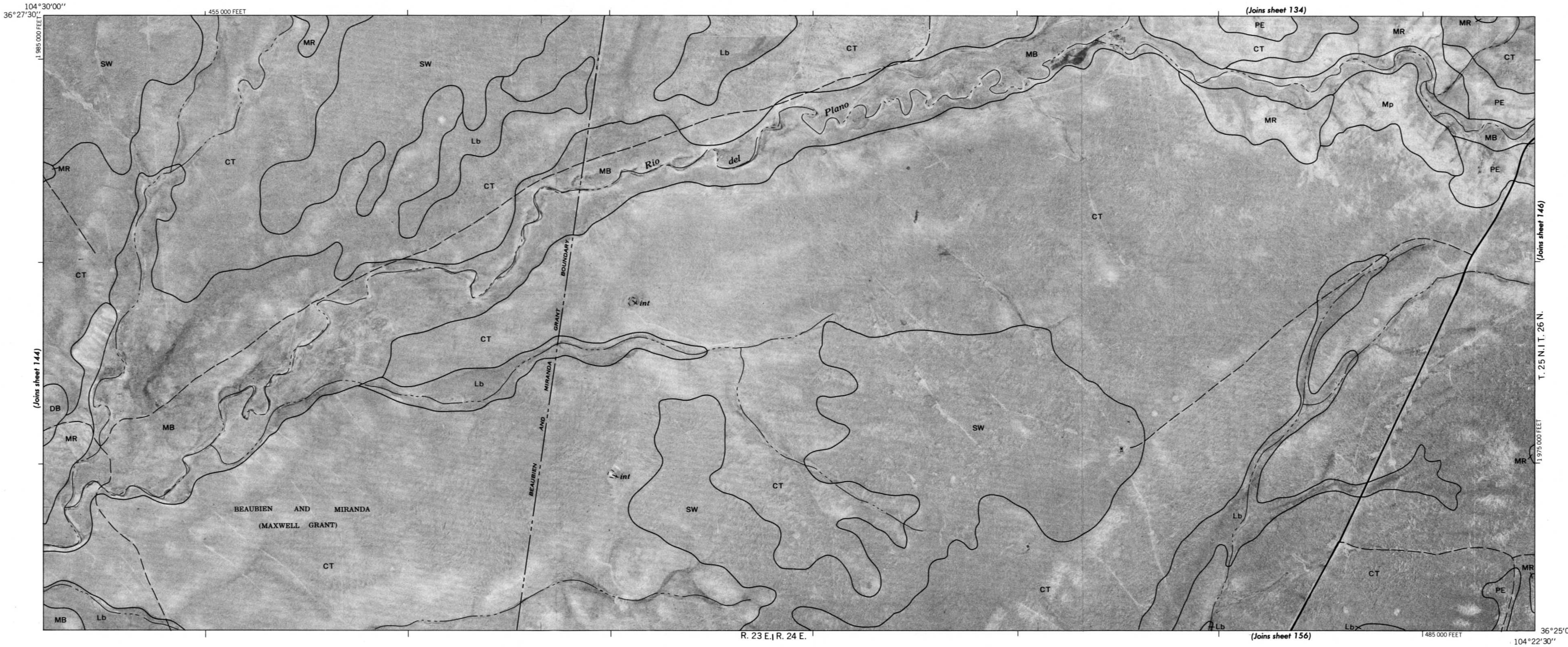
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 144

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

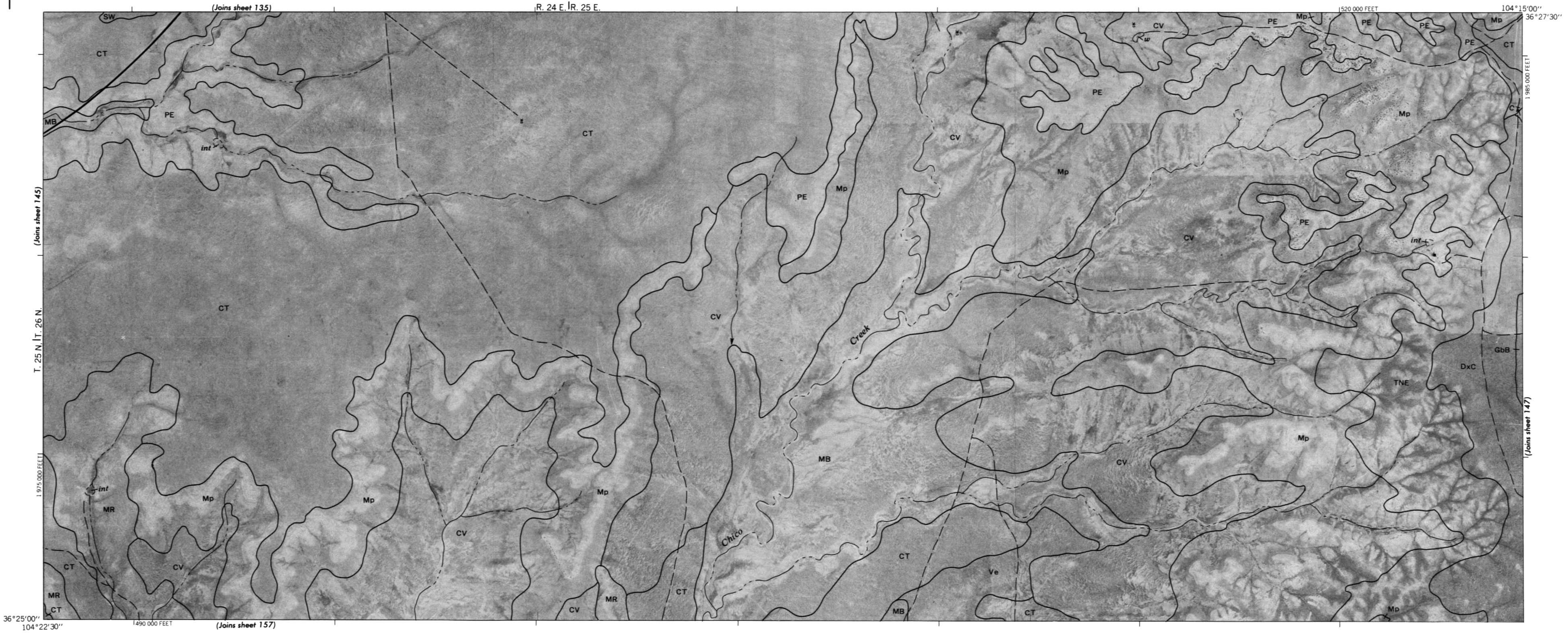
Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 145

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 146

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

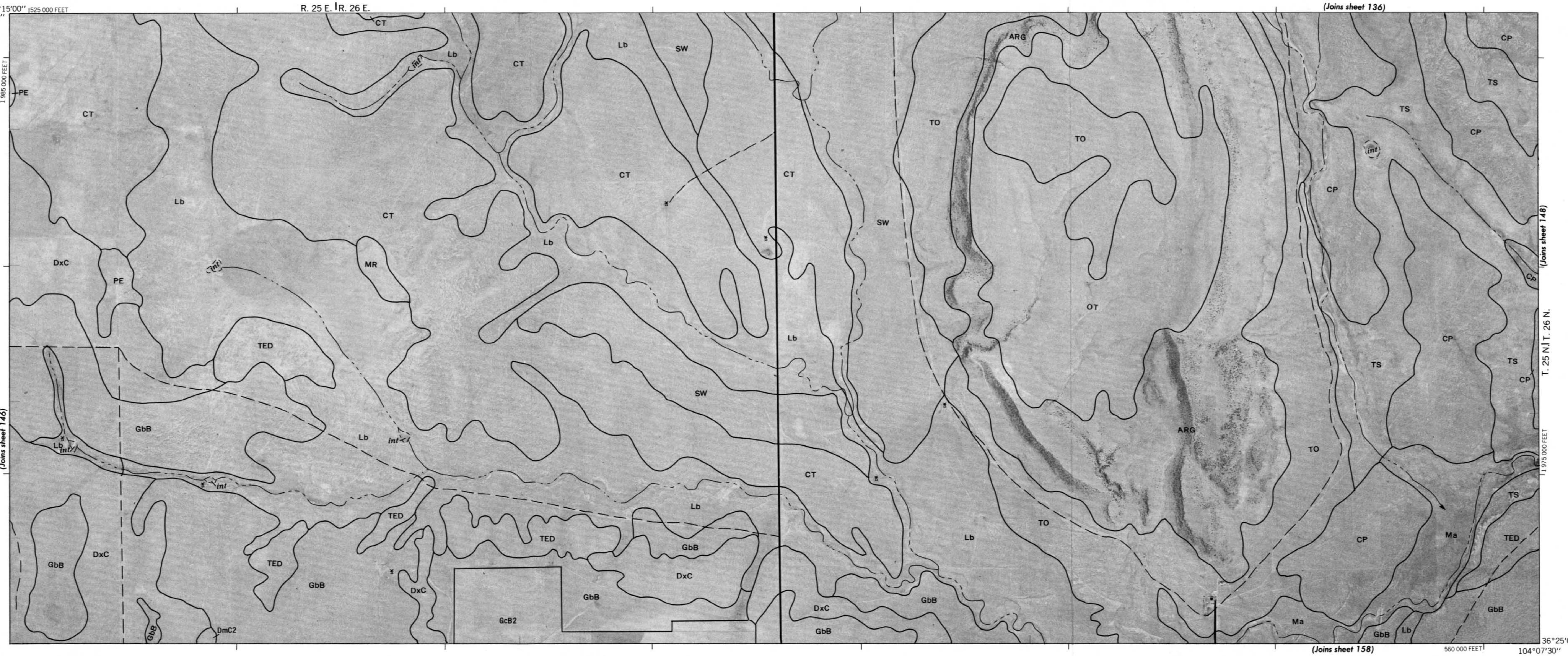
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 146

147

COLFAX COUNTY, NEW MEXICO NO. 147

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

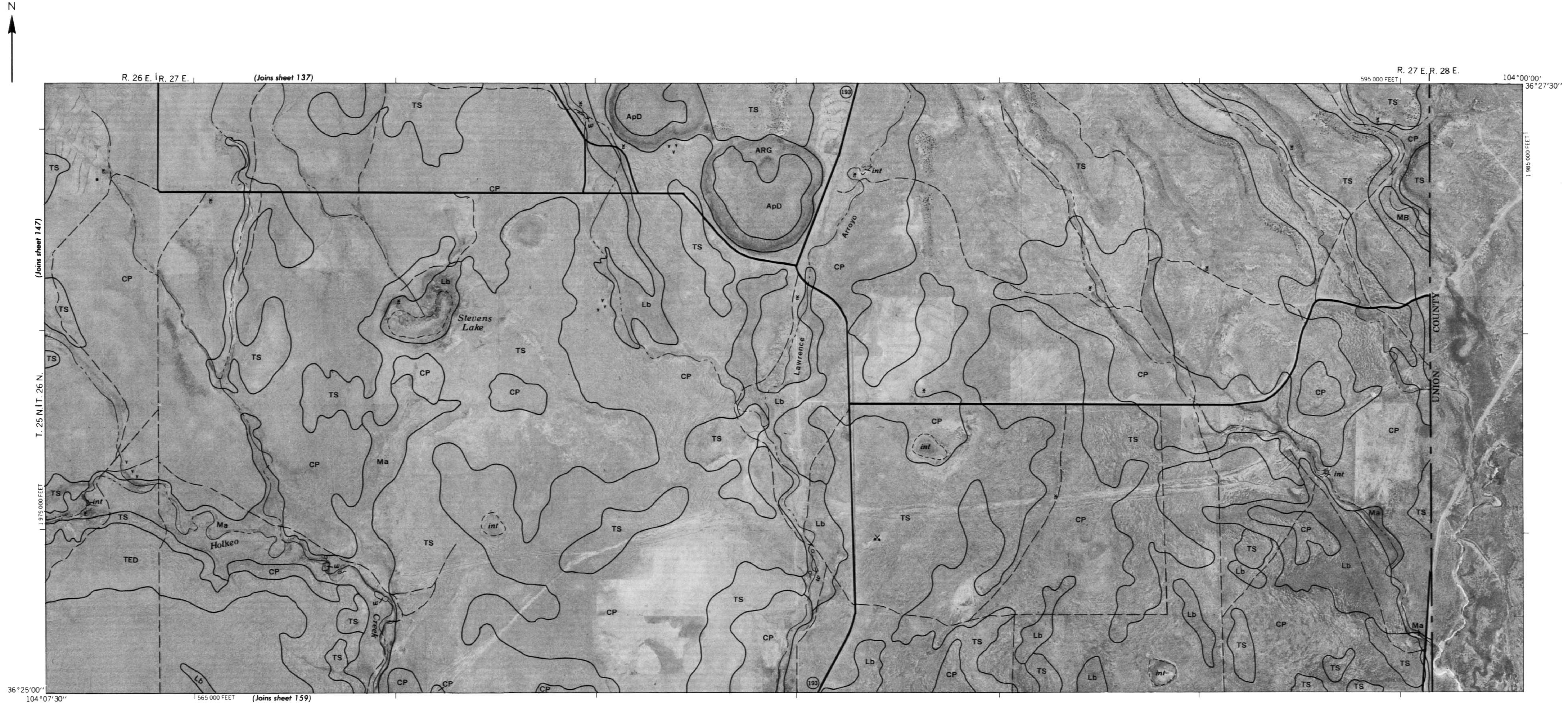


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 148



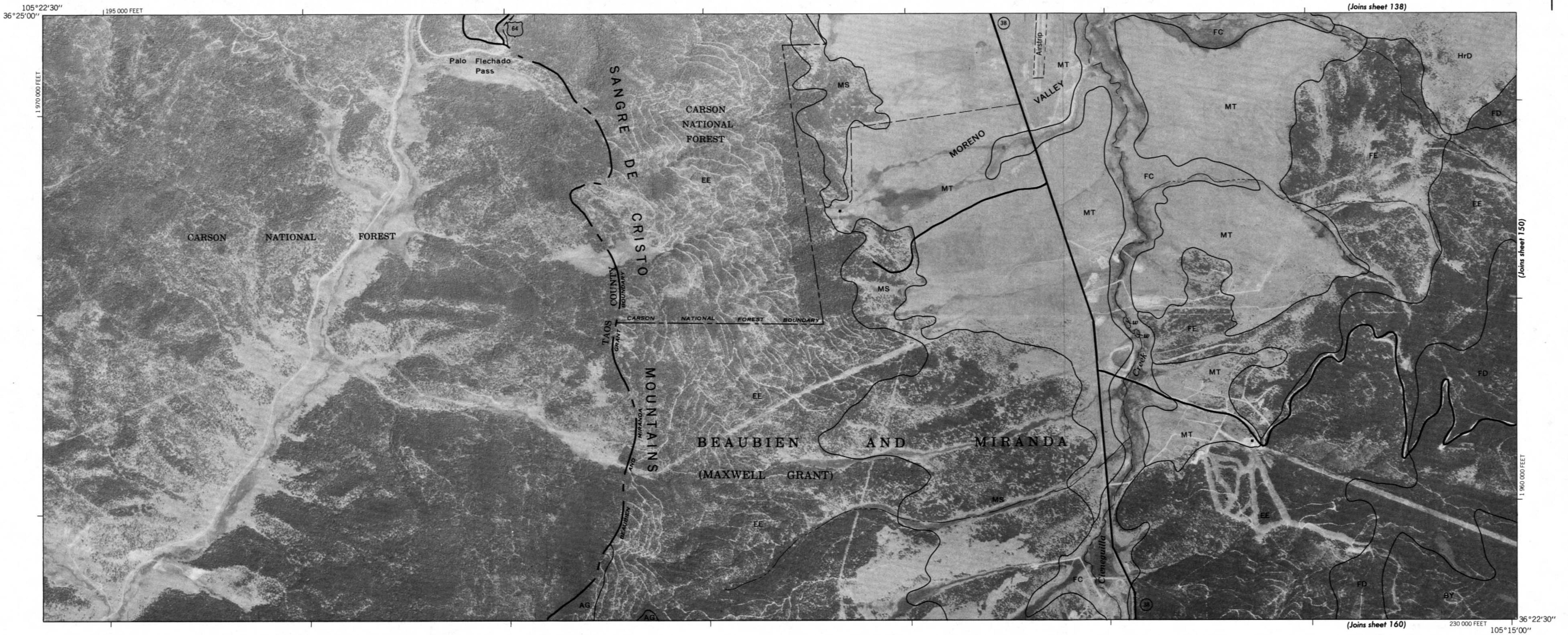
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 149

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 150

N

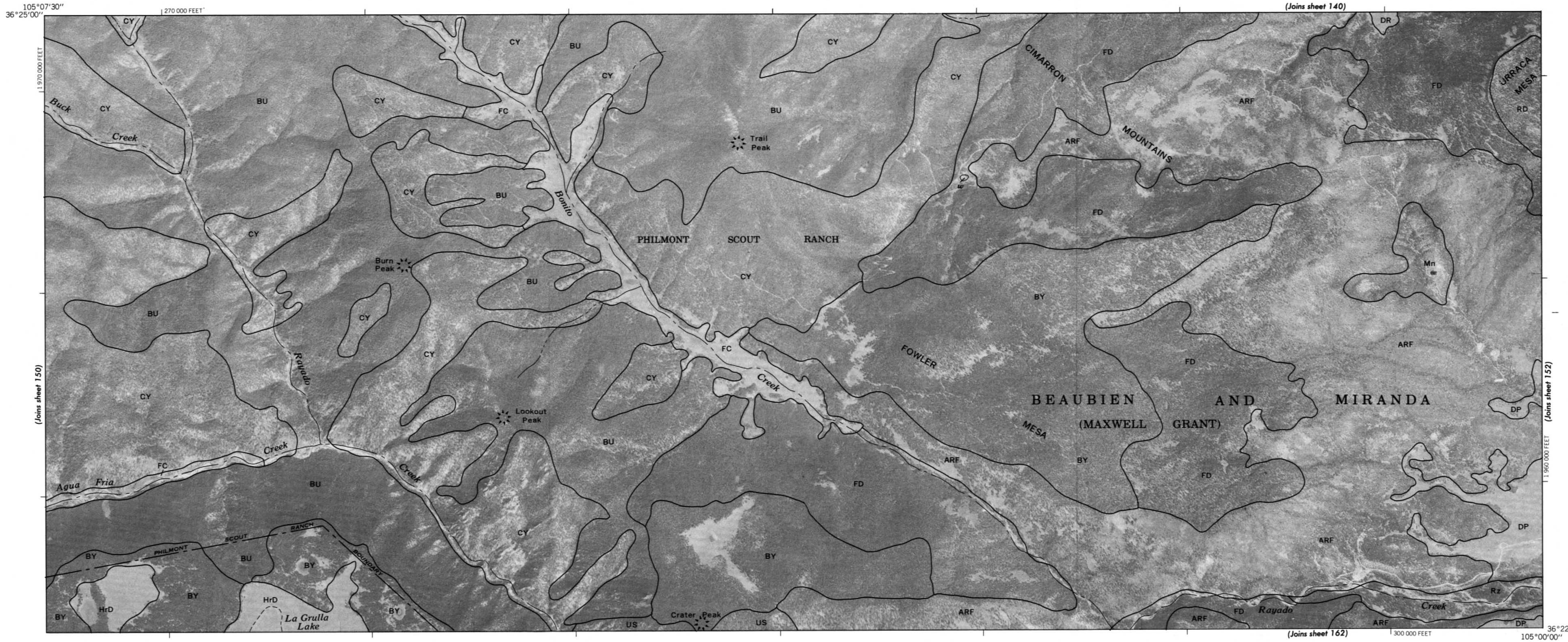
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



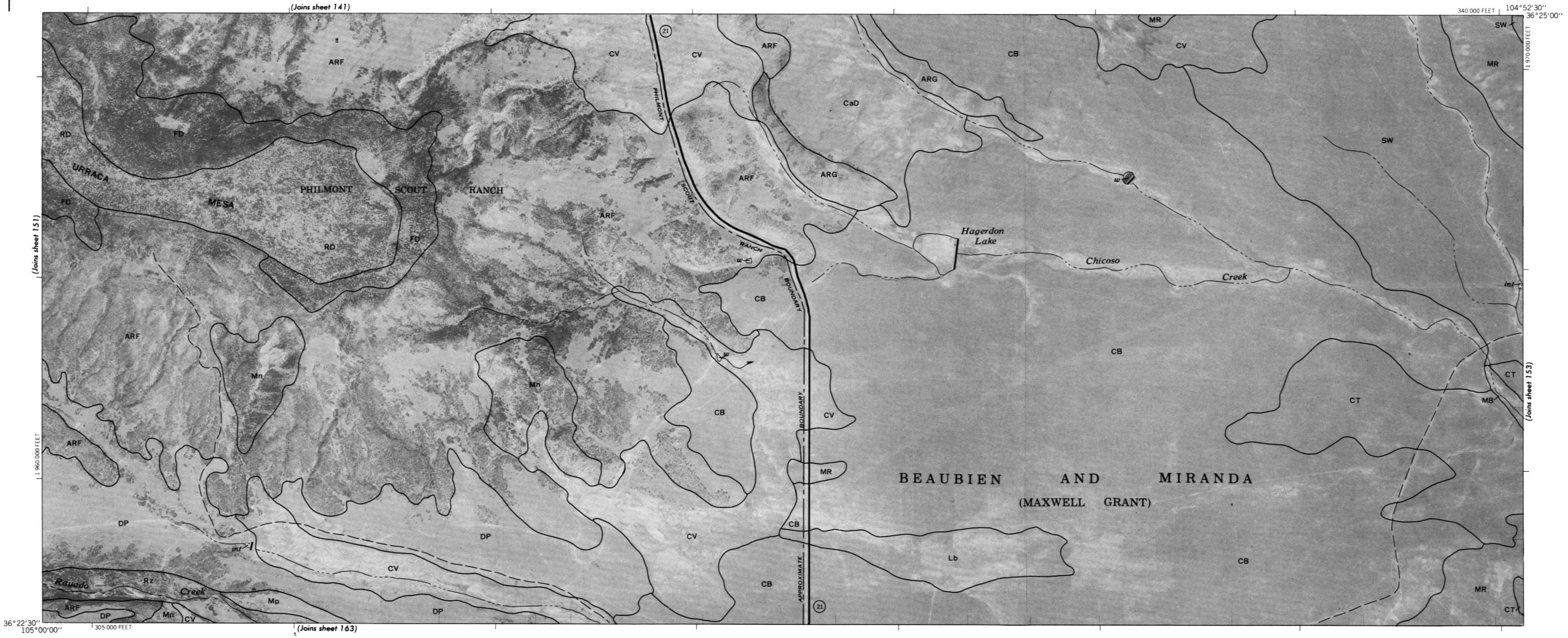
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 152



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

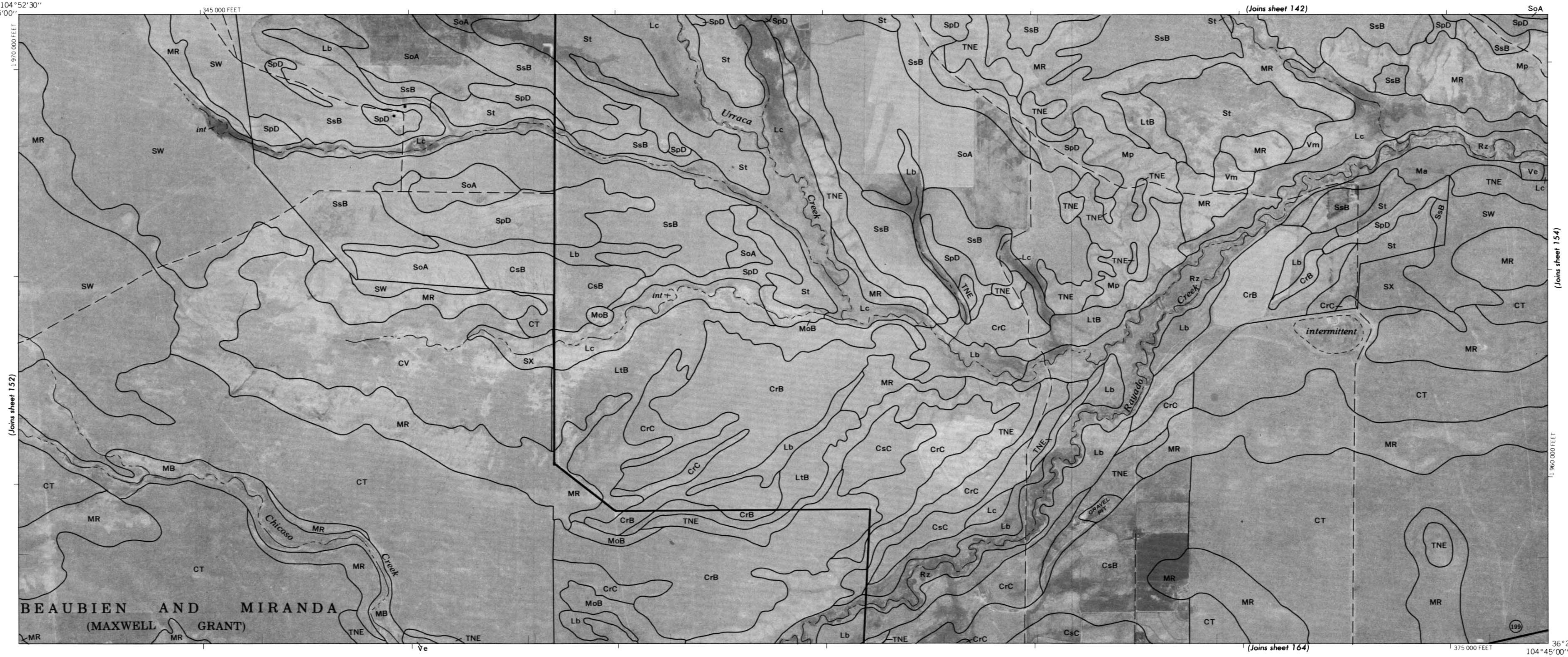
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

153

N



COLFAX COUNTY, NEW MEXICO NO. 153

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

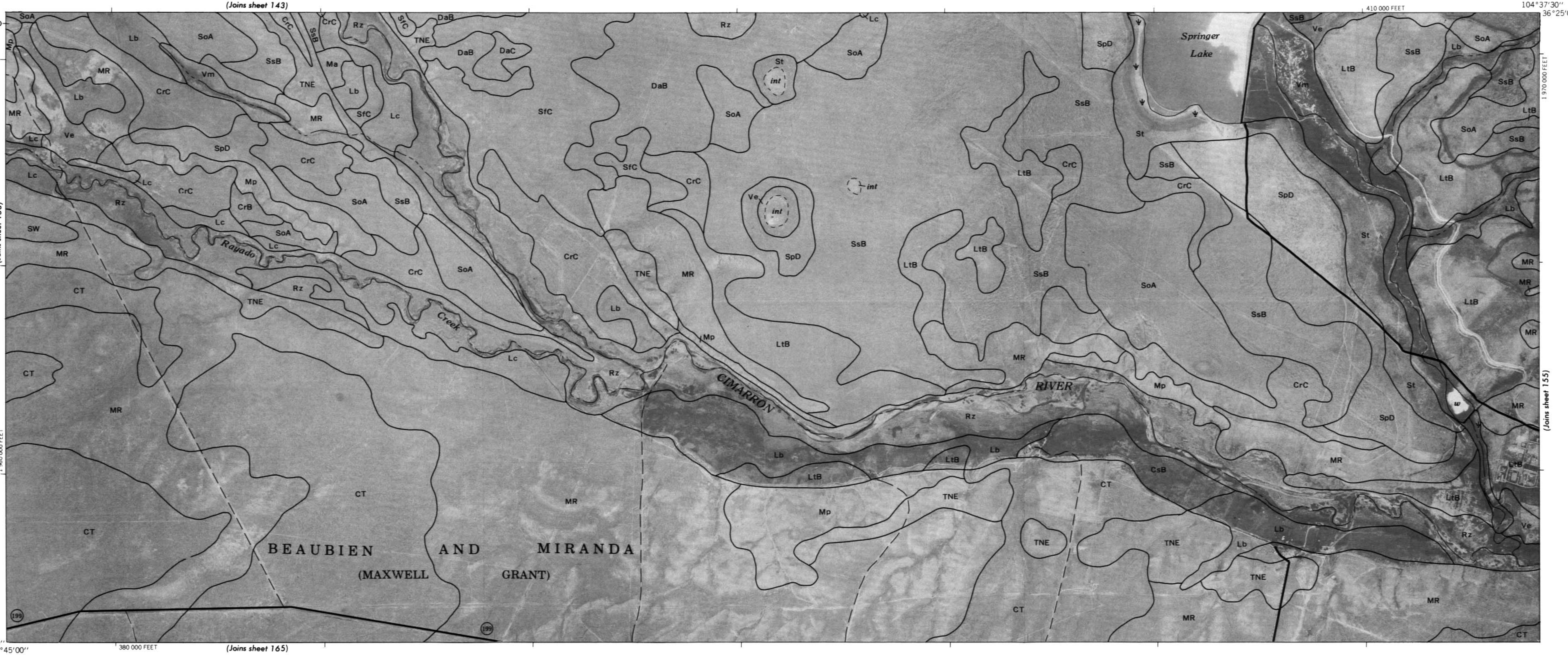
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 154



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

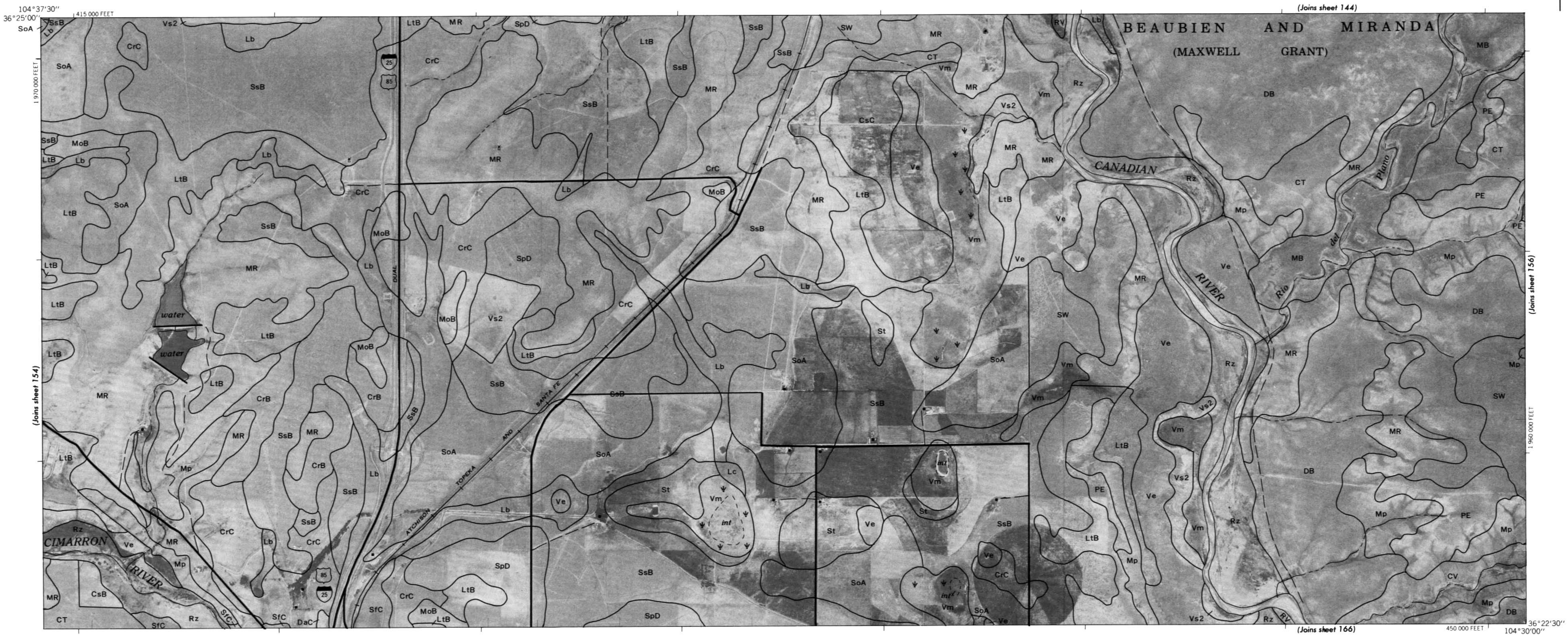
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 154

155

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

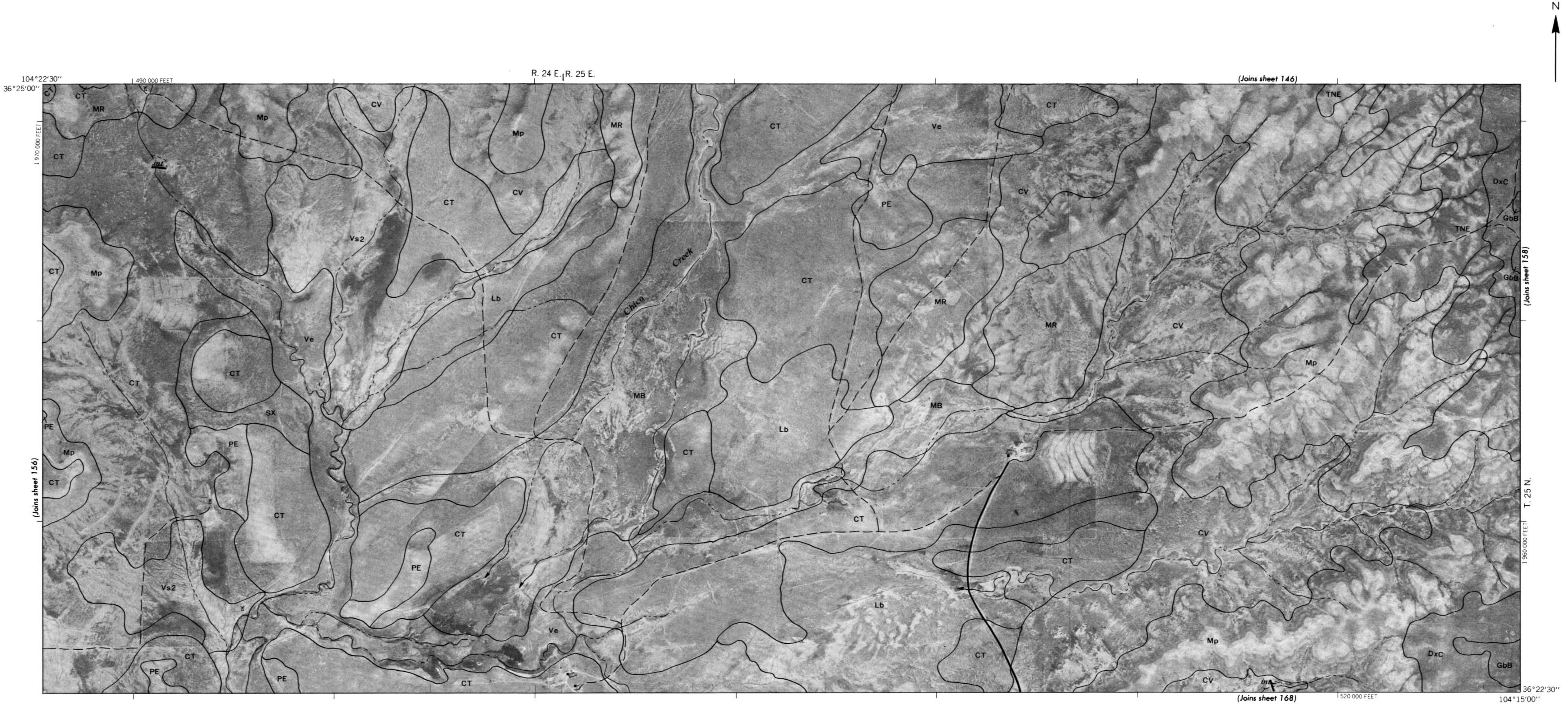
Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 156

1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 157



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 157

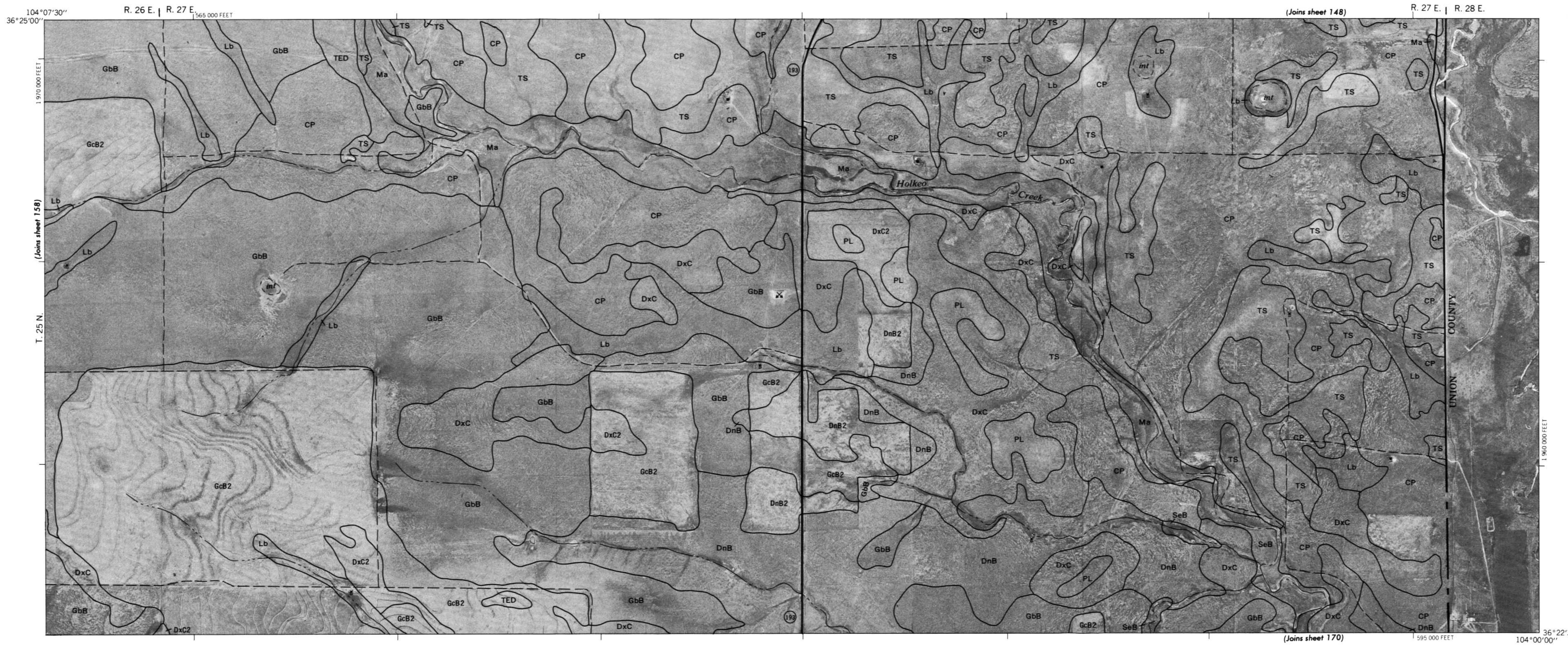
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 158

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 158

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

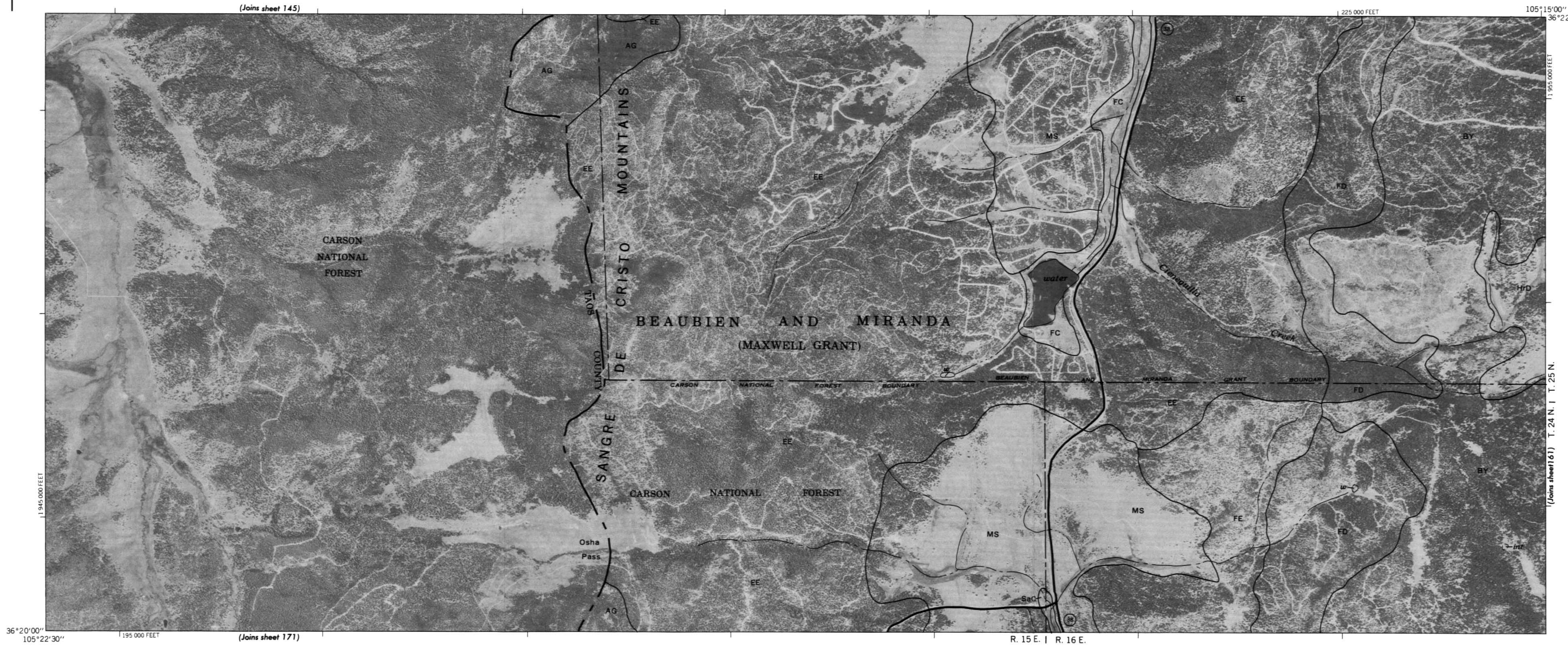
COLFAX COUNTY, NEW MEXICO NO. 159

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 160

(Joins sheet 145)



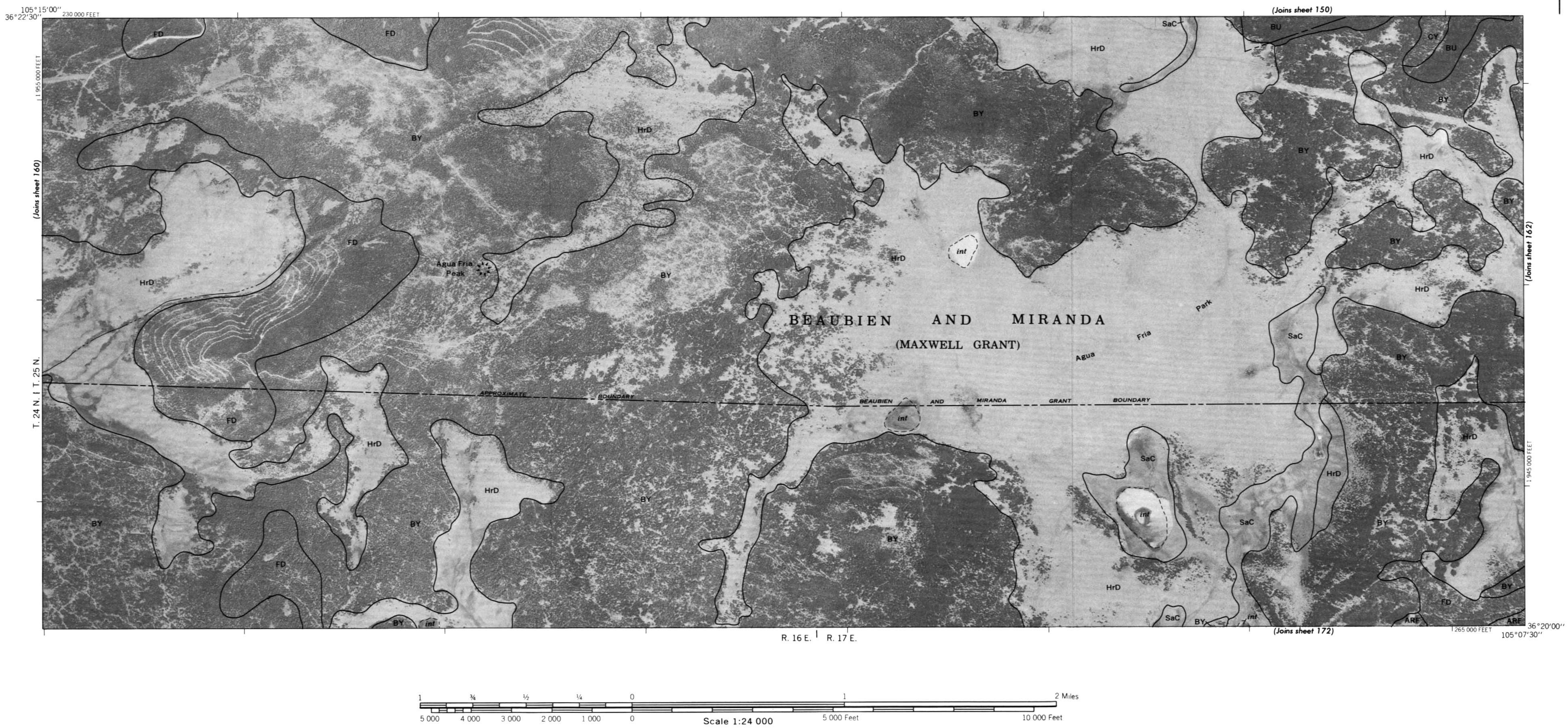
(Joins sheet 171)

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

161

N



COLFAX COUNTY, NEW MEXICO NO. 161

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 162

N

(Joins sheet 151)

105°00′00″
36°22′30″
300 000 FEET
1 955 000 FEET

(Joins sheet 161)

T. 25 N.
T. 24 N.
1 945 000 FEET

(Joins sheet 163)

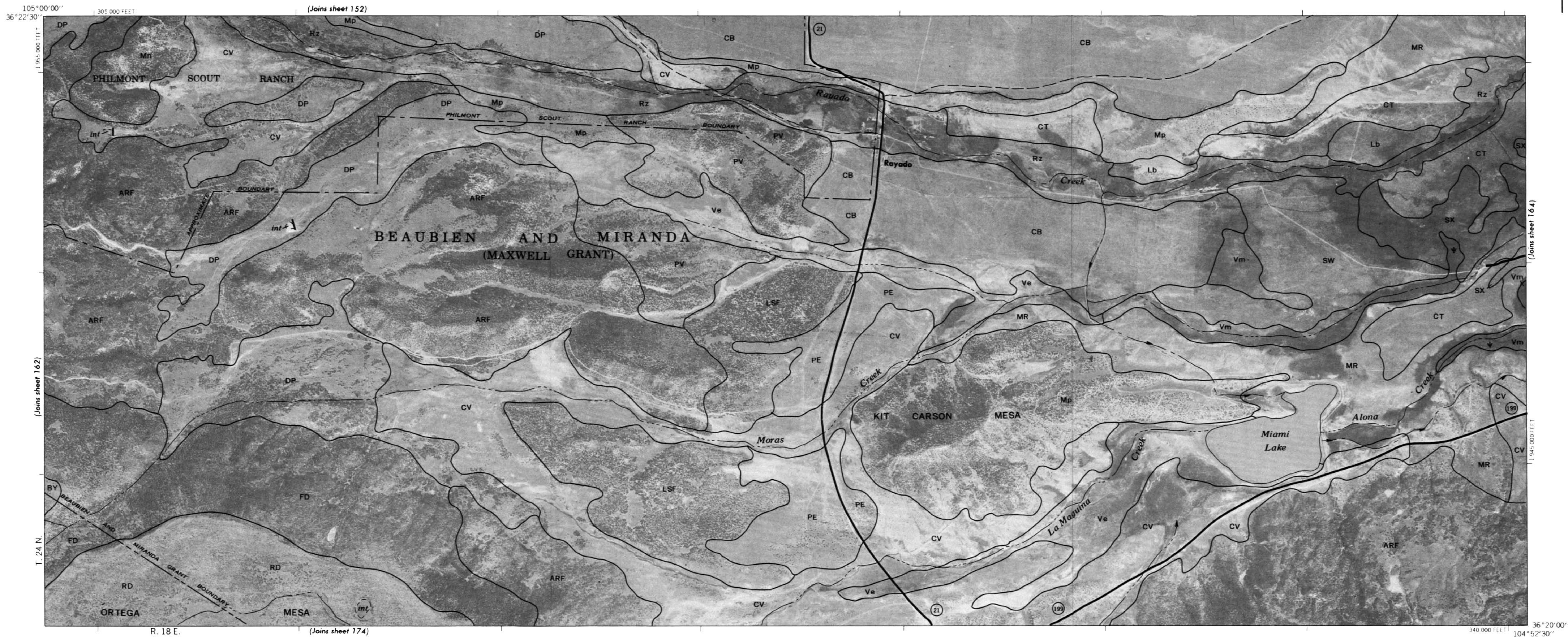
36°20′00″
105°07′30″
270 000 FEET
(Joins sheet 173)
R. 17 E. | R. 18 E.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

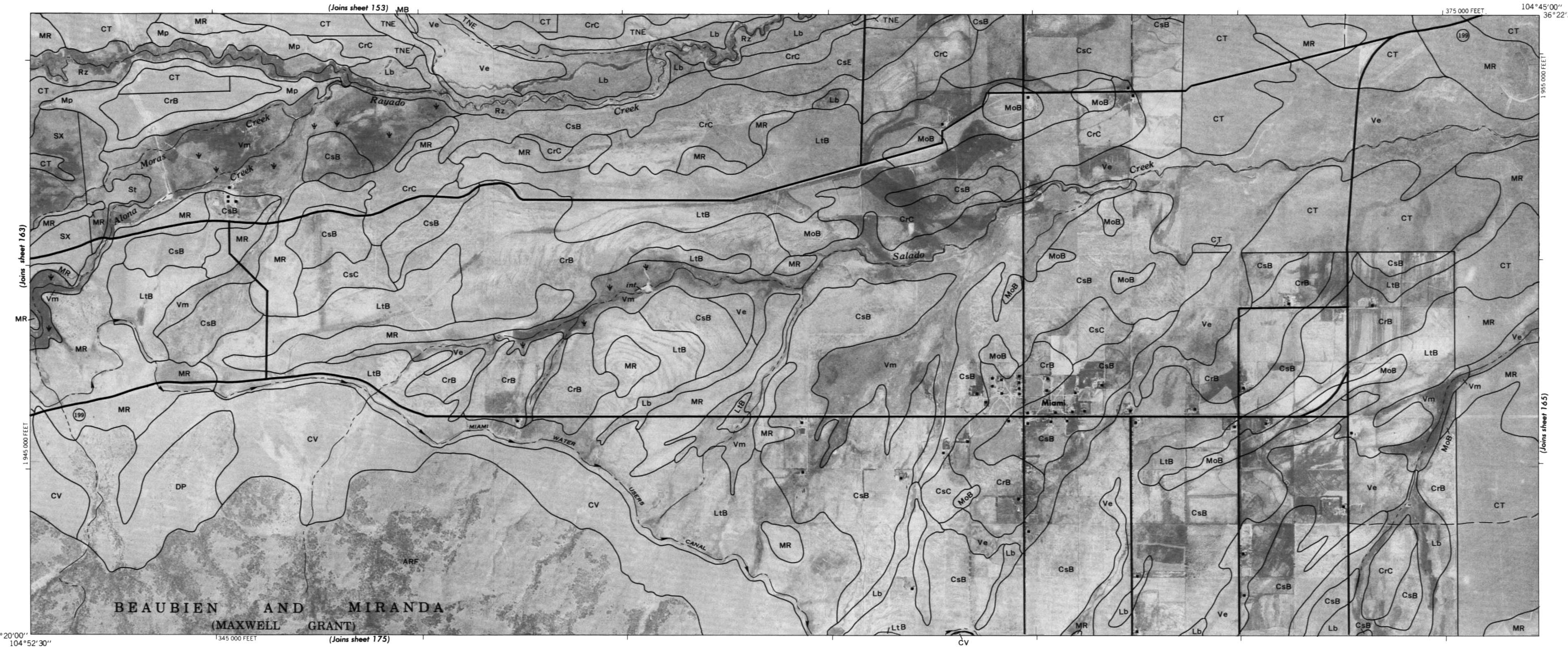
COLFAX COUNTY, NEW MEXICO NO. 163

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

164

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 164

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

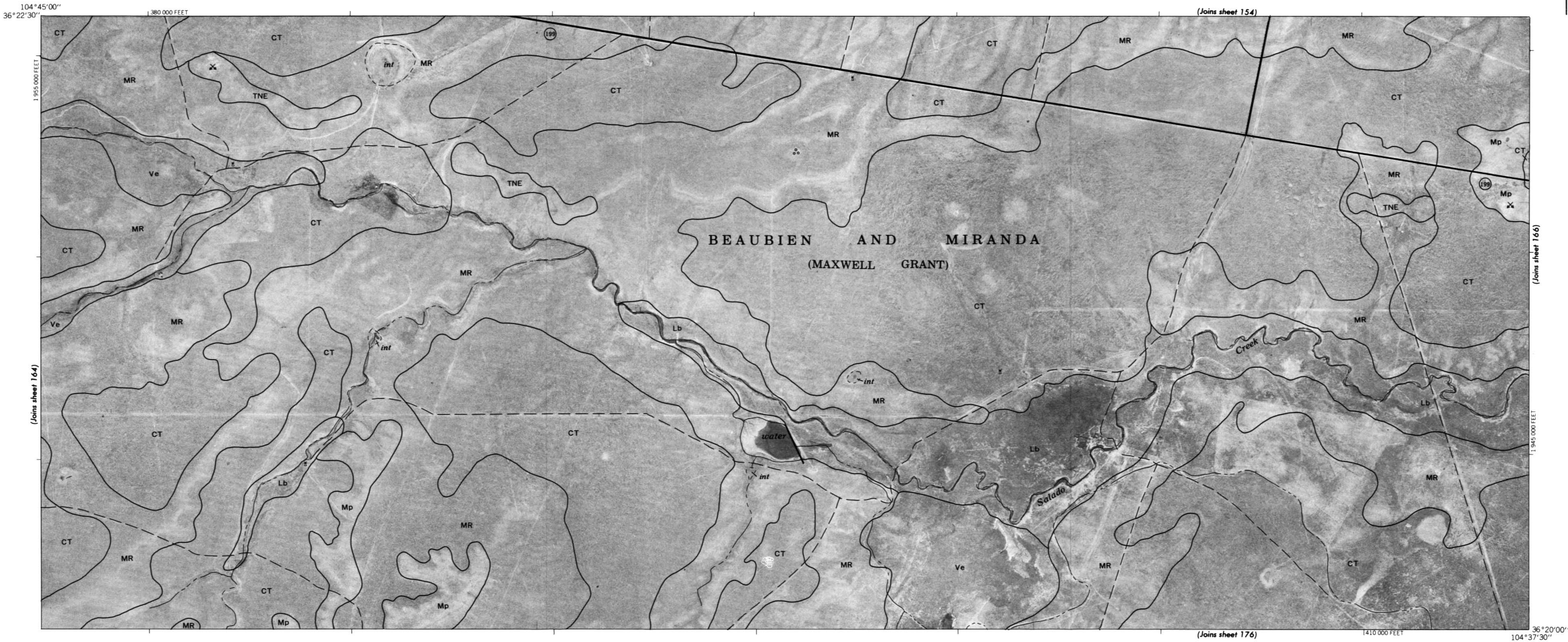
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 164

N



COLFAX COUNTY, NEW MEXICO NO. 165

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

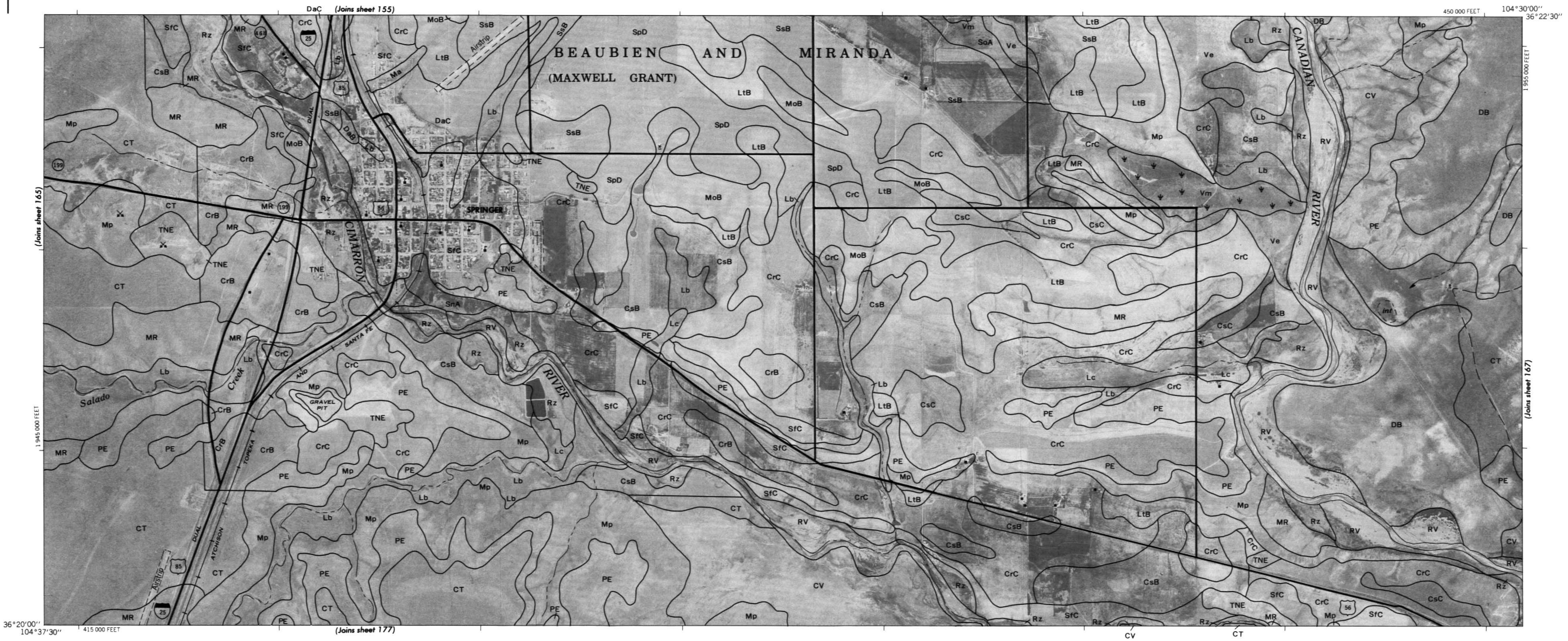
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

166

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 166



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 166

167

N

COLFAX COUNTY, NEW MEXICO NO. 167

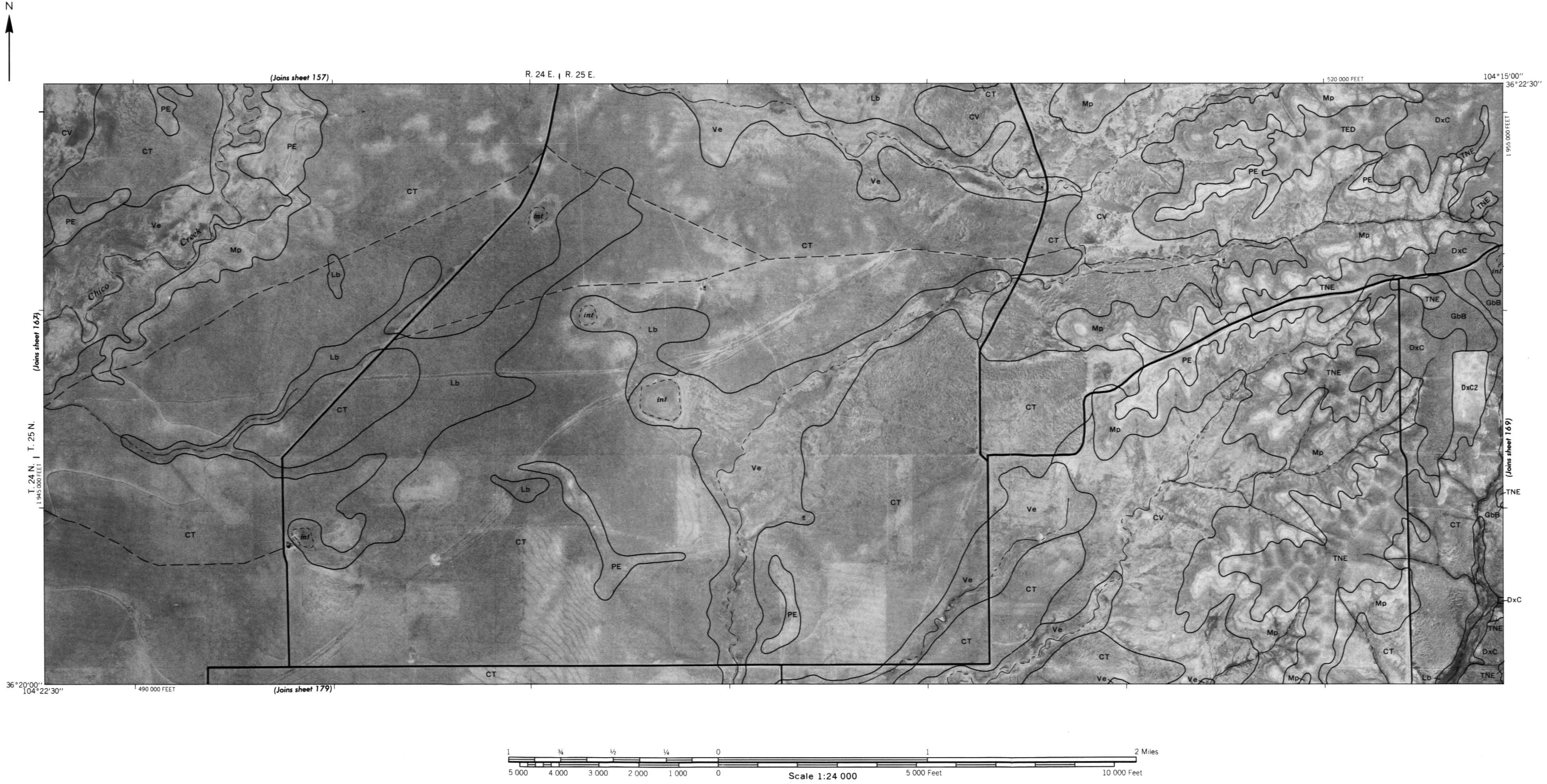
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 168



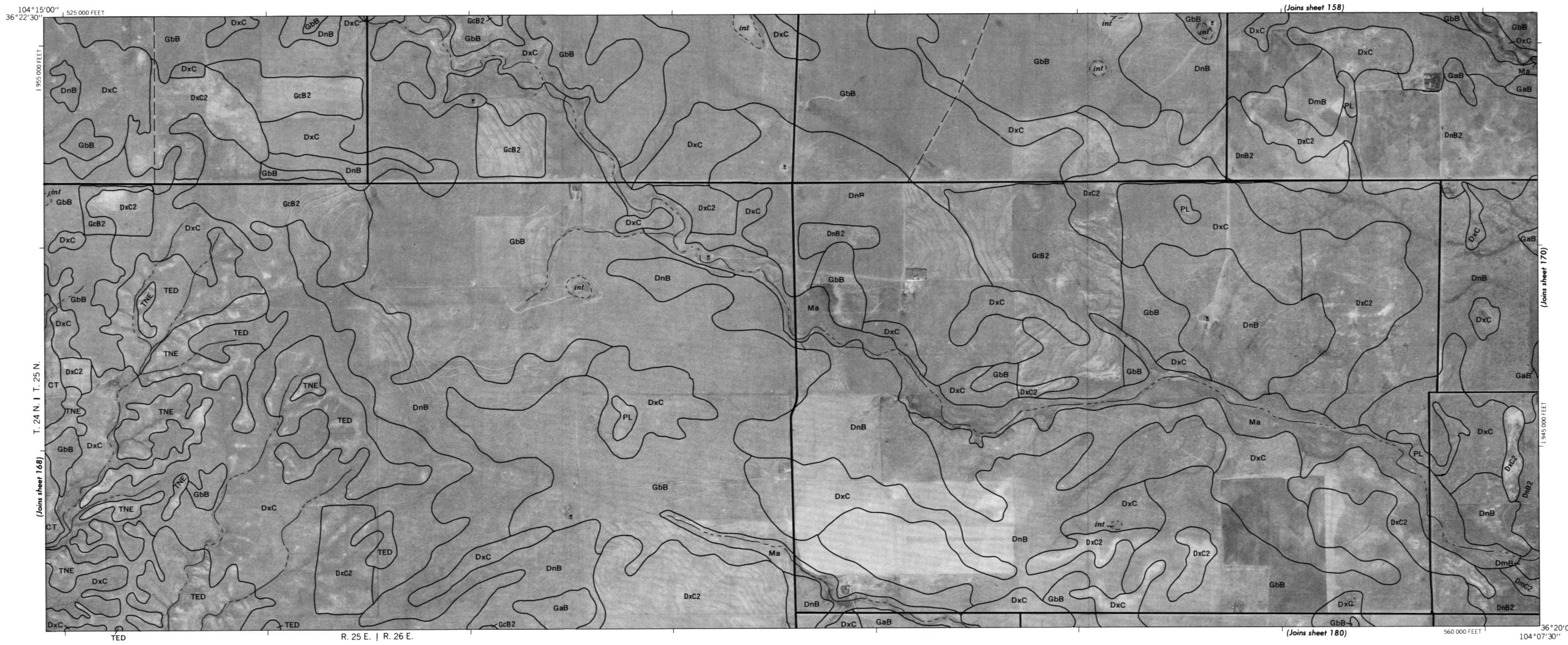
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

169

N

COLFAX COUNTY, NEW MEXICO NO. 169

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

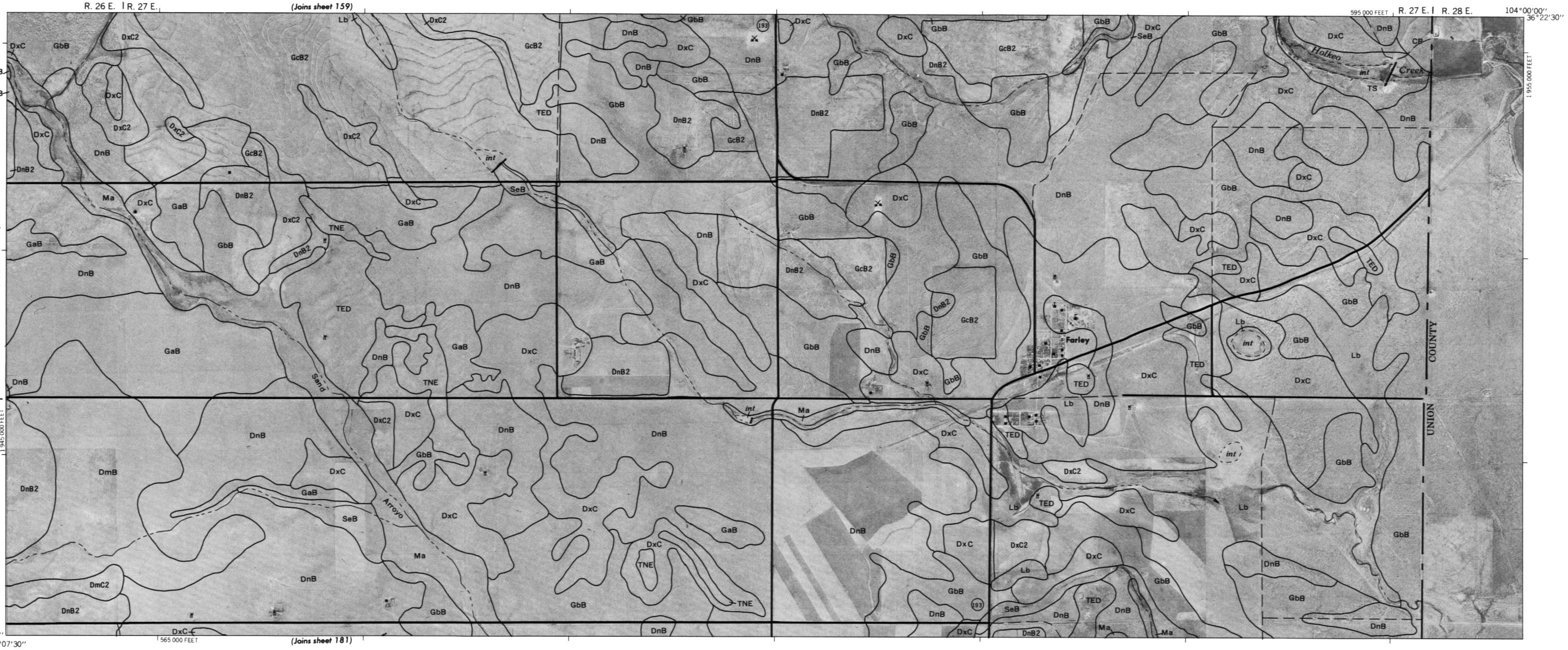


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

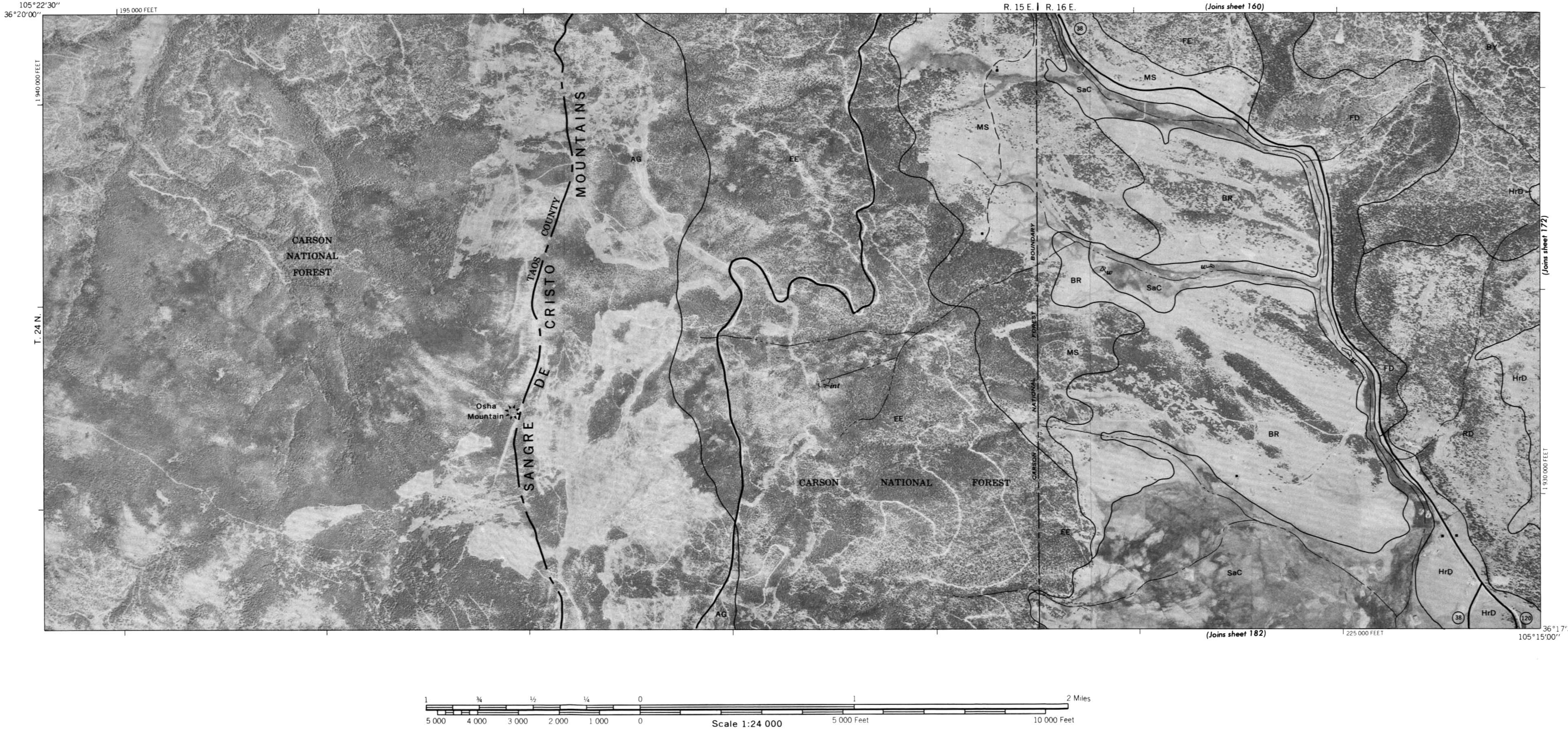
COLFAX COUNTY, NEW MEXICO NO. 170

171

N

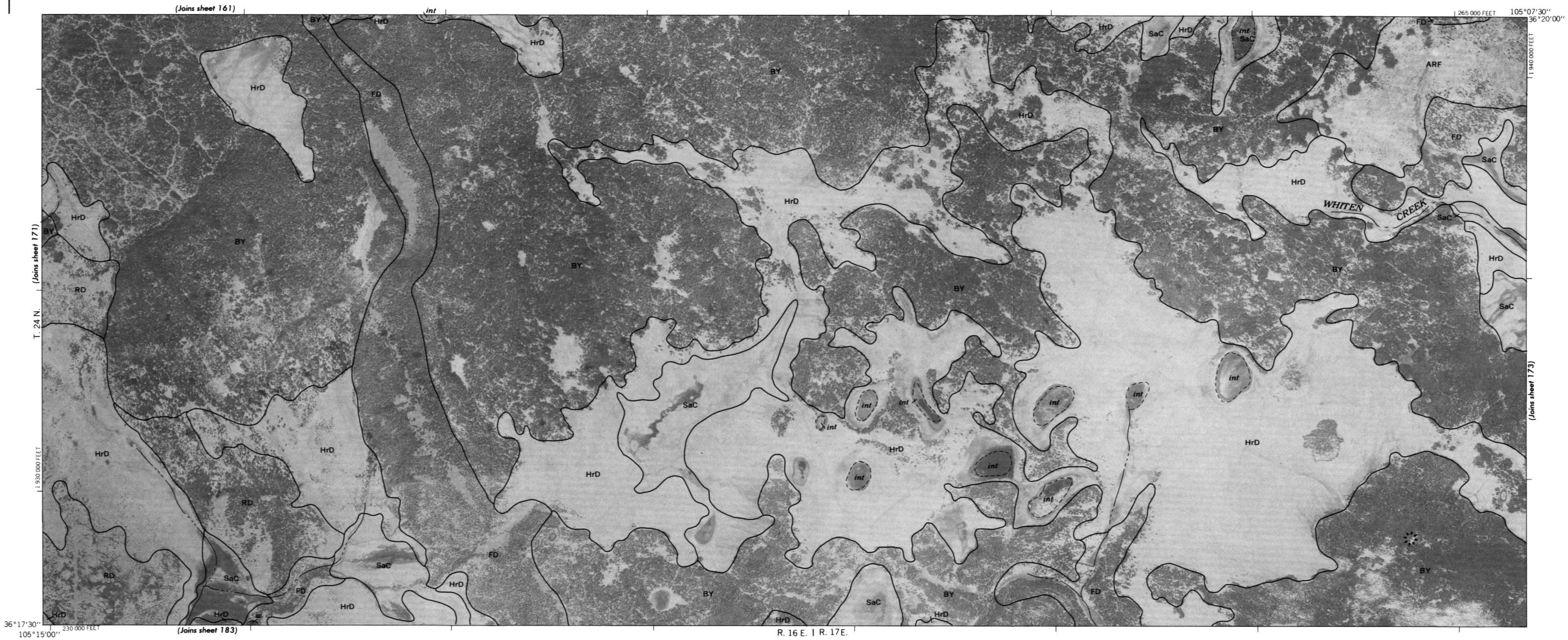
COLFAX COUNTY, NEW MEXICO NO. 171

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



172

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N

1 ¾ ½ ¼ 0 1 2 Miles

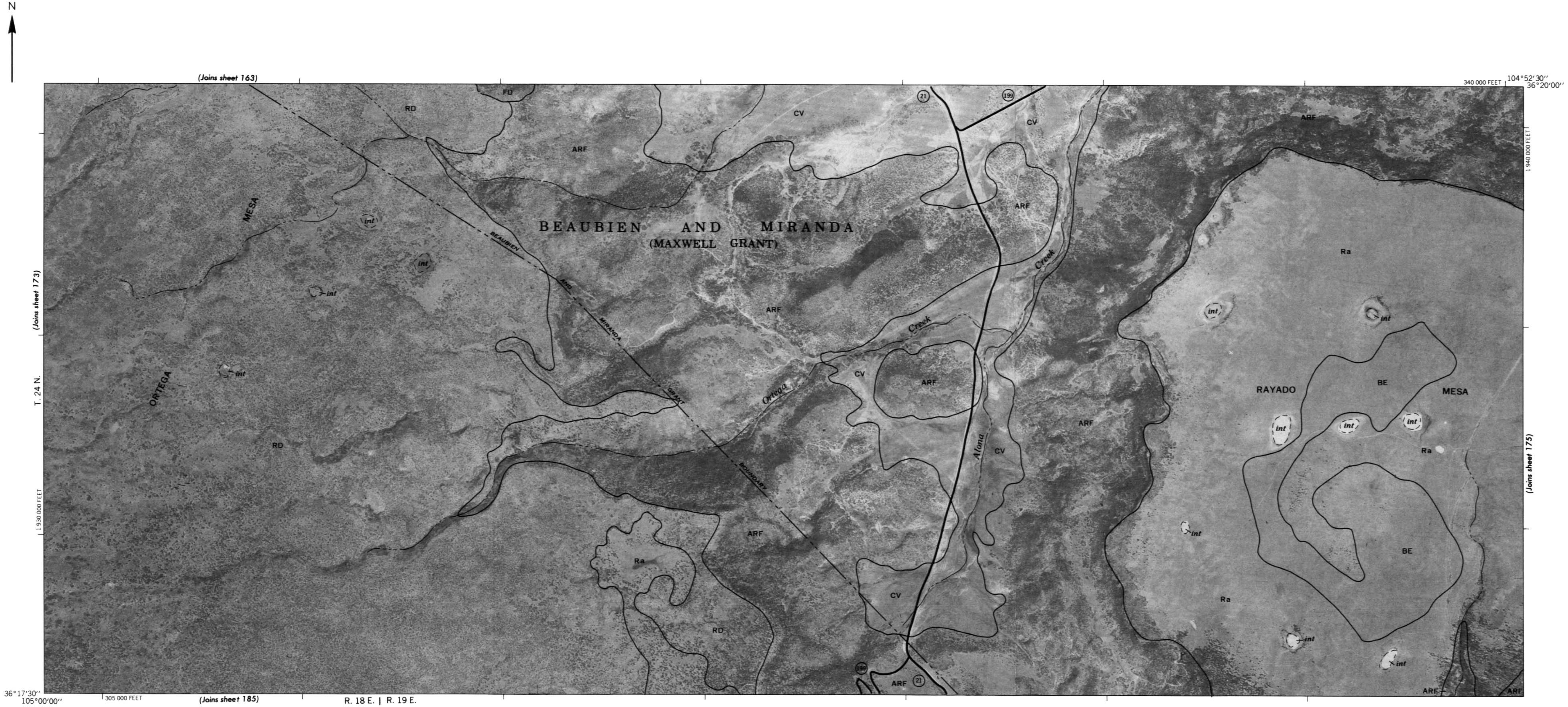
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 173

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 174



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 174

175

N

COLFAX COUNTY, NEW MEXICO NO. 175

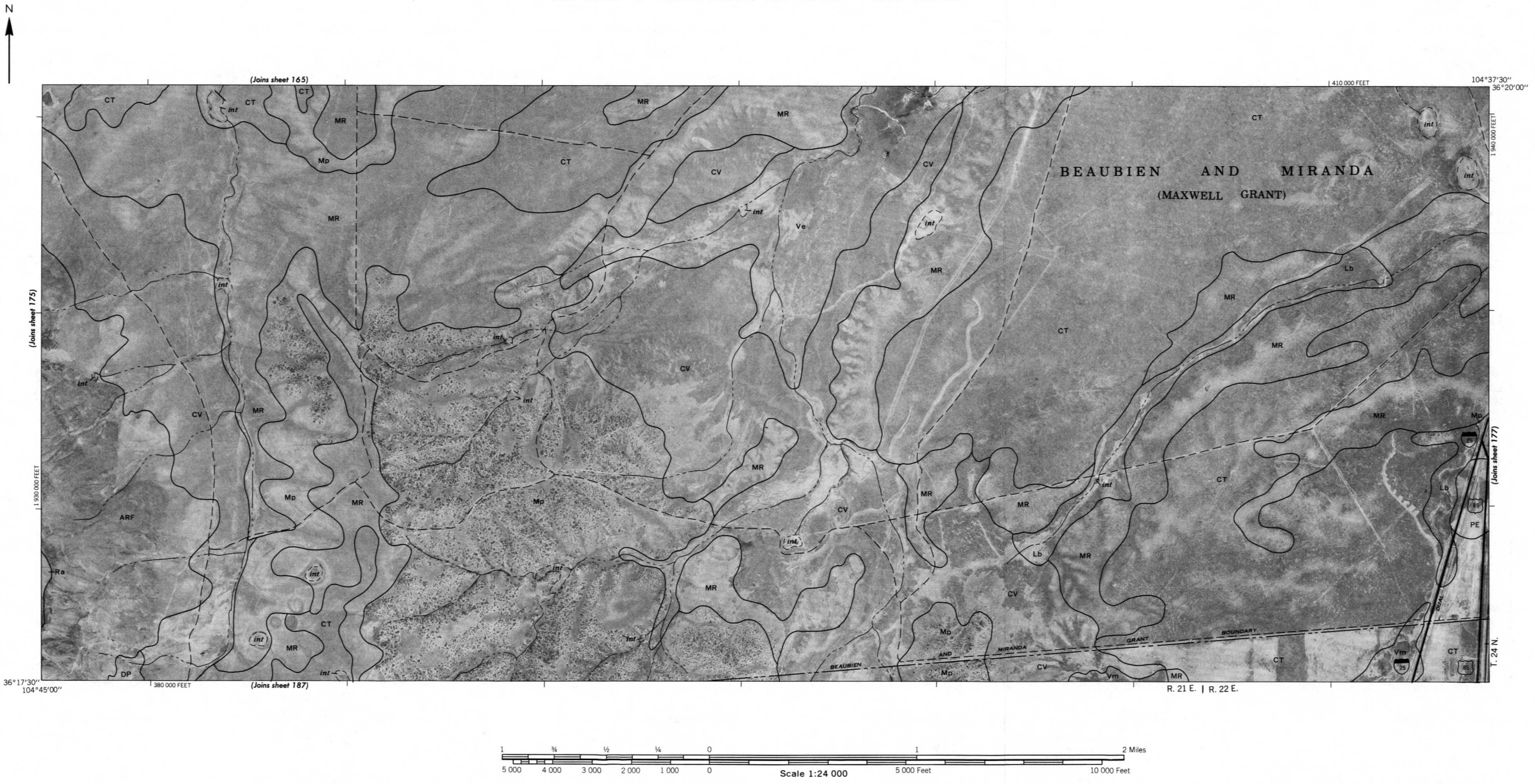
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

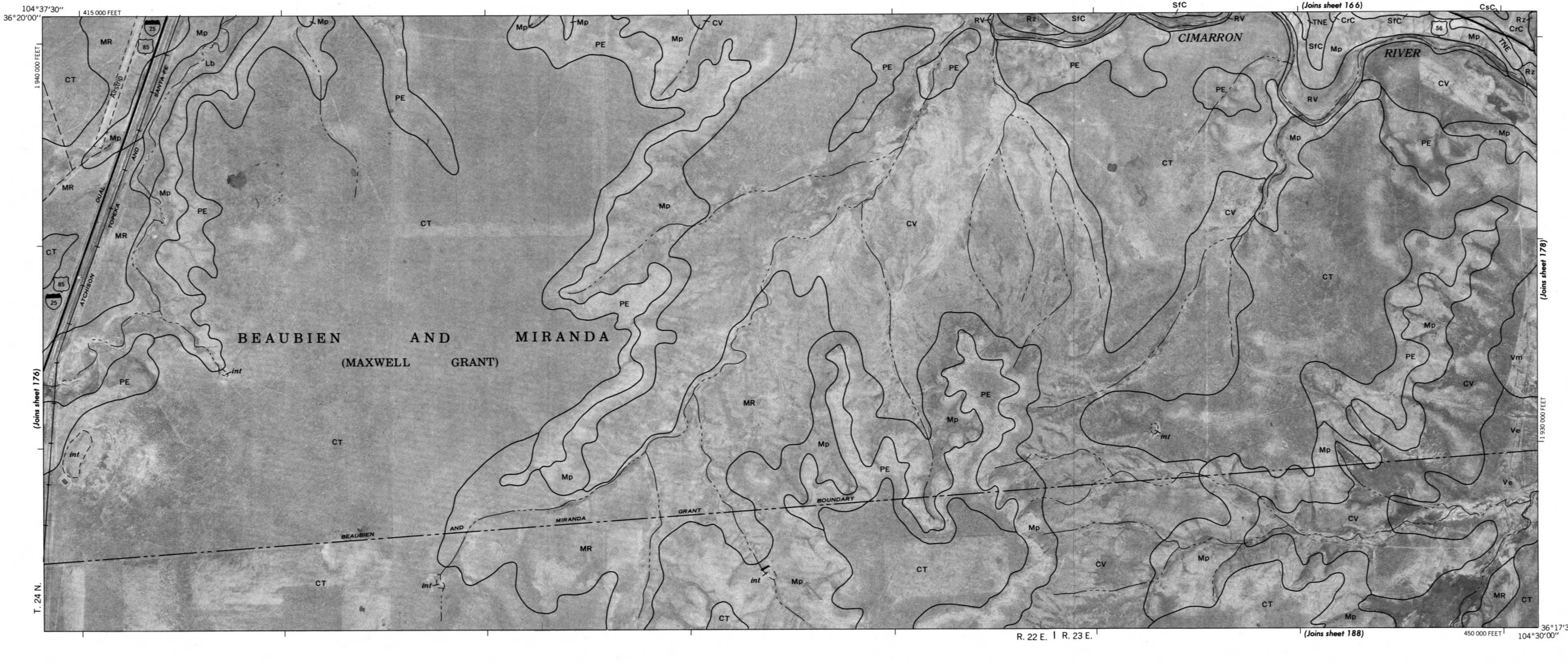
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 176



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 176

N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

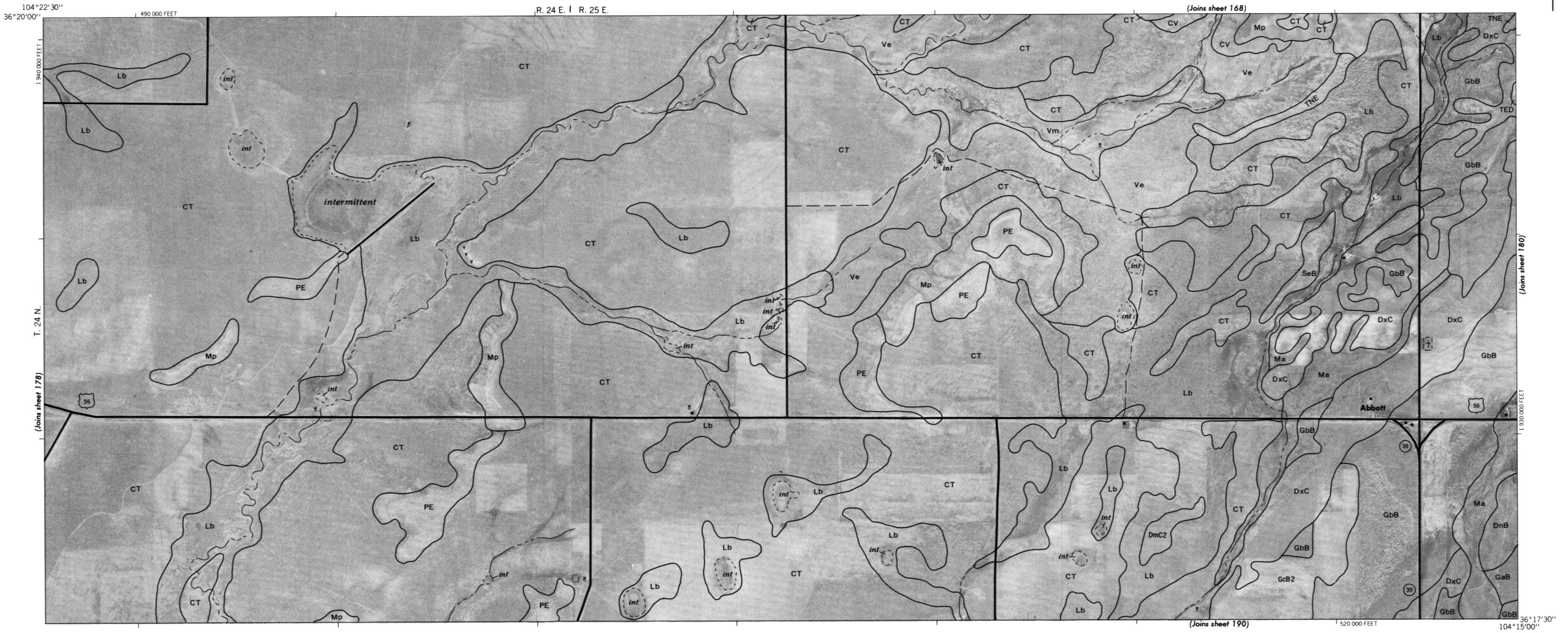
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

179

N

COLFAX COUNTY, NEW MEXICO NO. 179

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

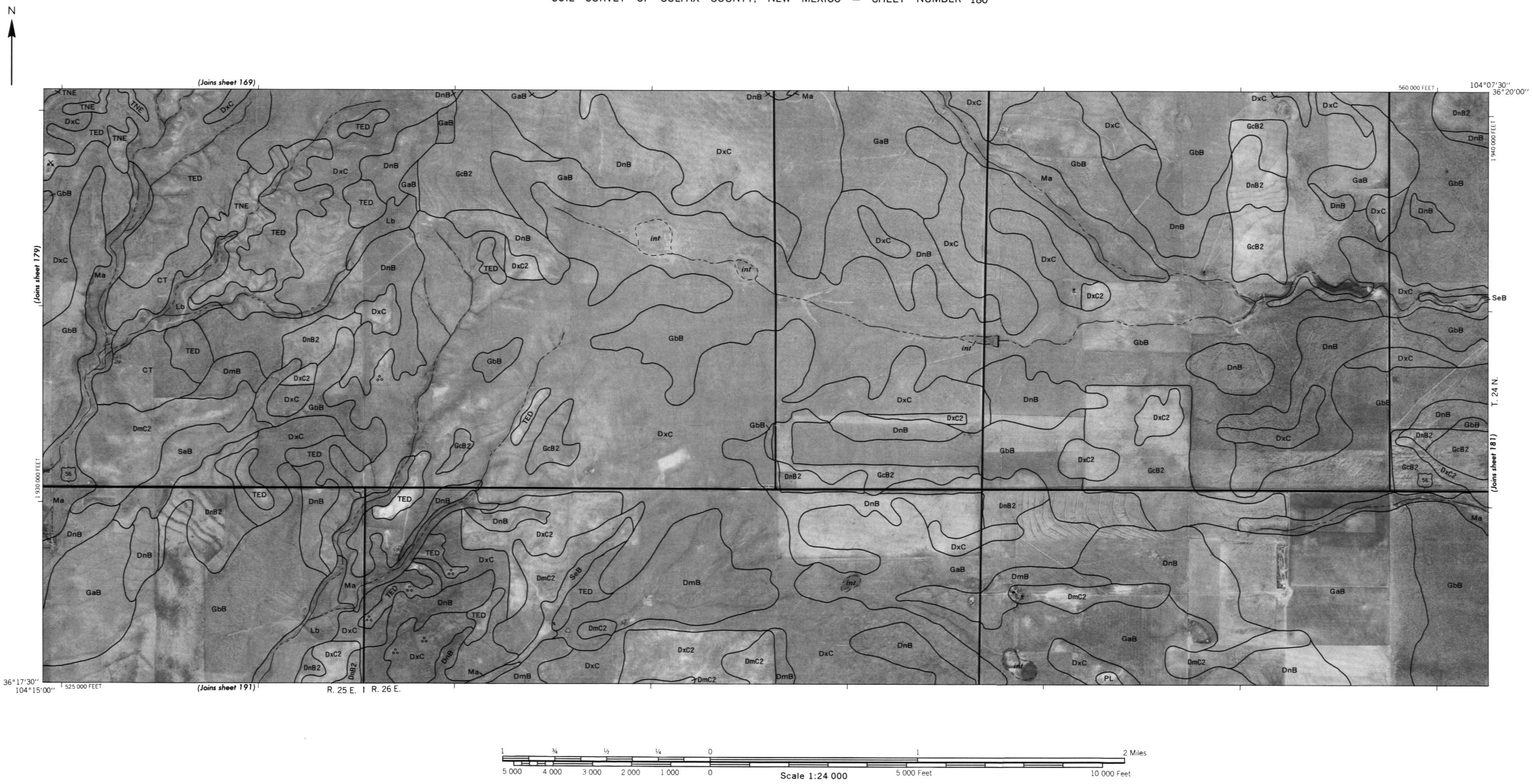


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 180



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

COLFAX COUNTY, NEW MEXICO NO. 180

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 181

181

N

COLFAX COUNTY, NEW MEXICO NO. 181

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

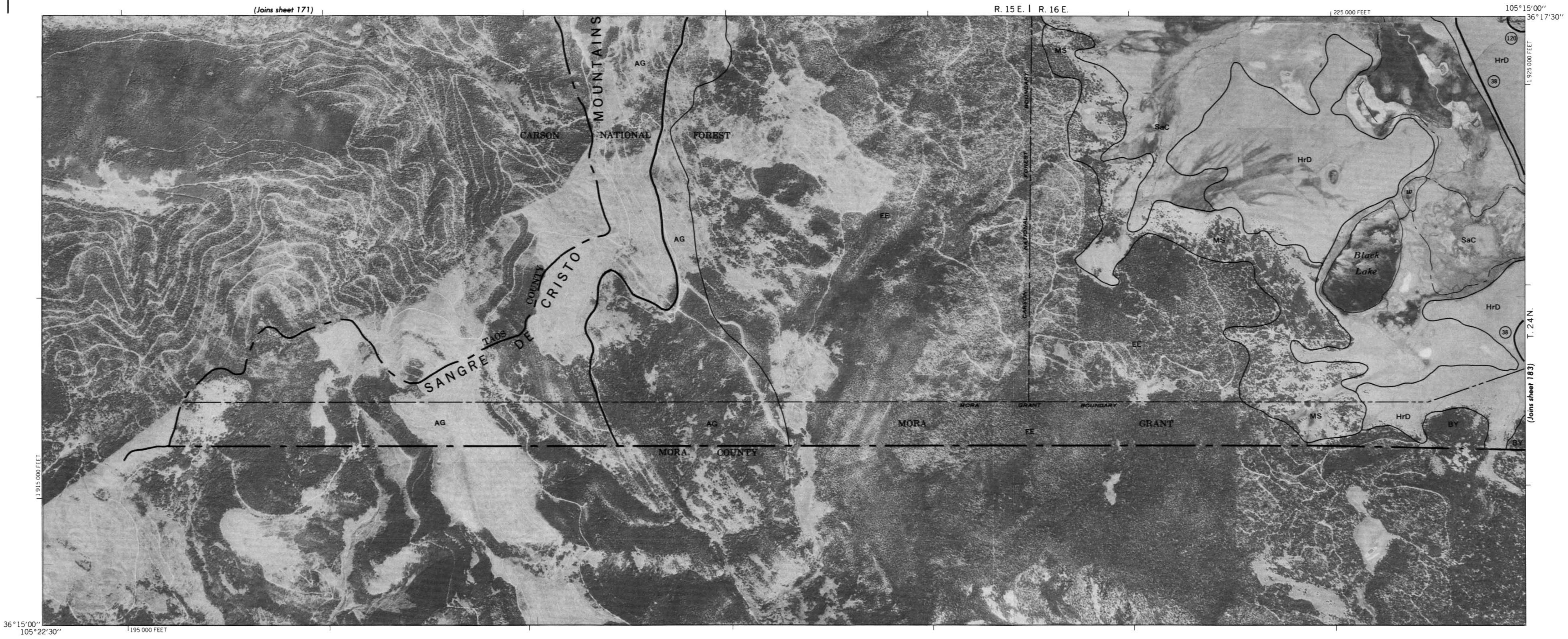
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 182

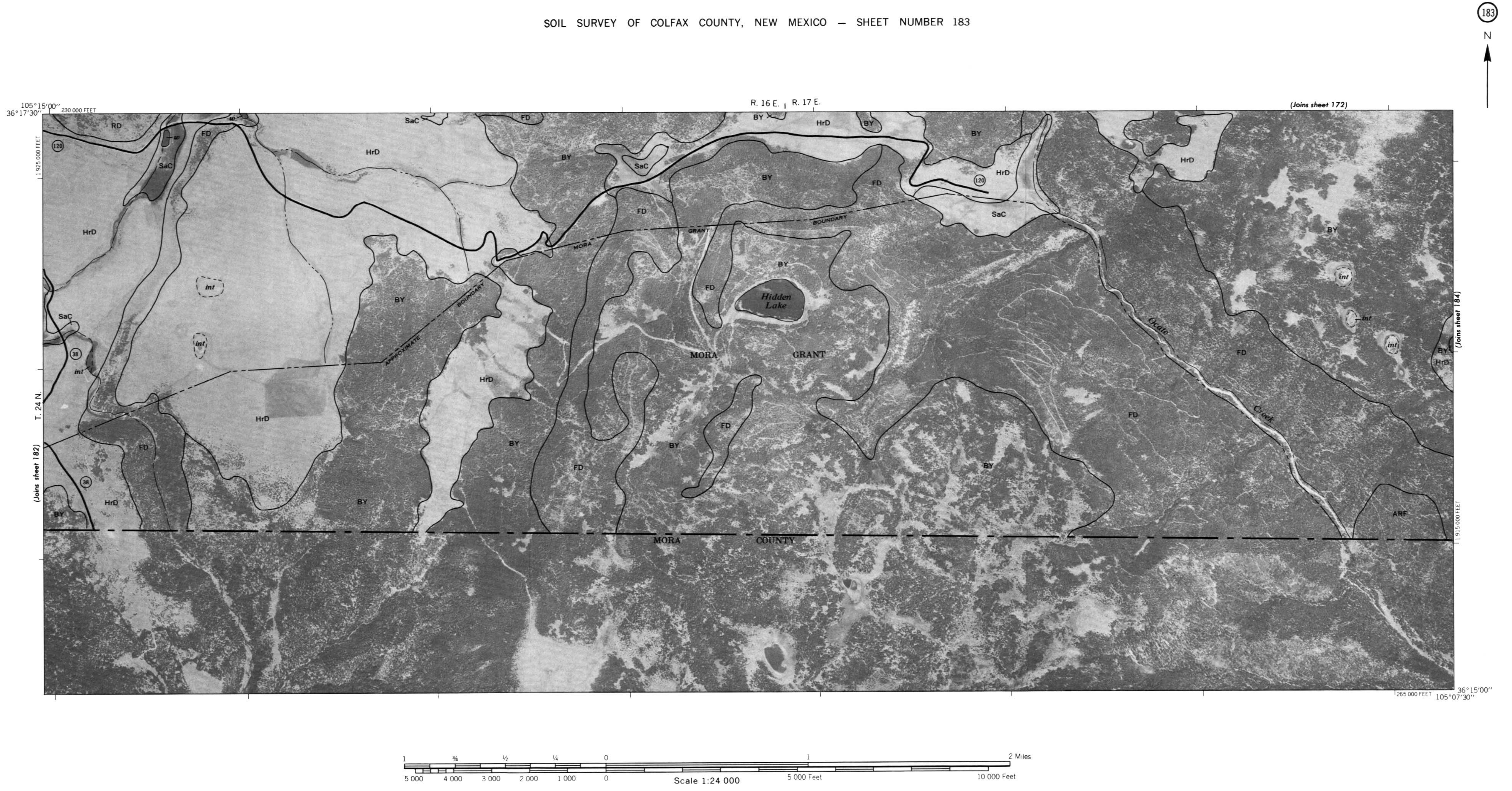


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.



COLFAX COUNTY, NEW MEXICO NO. 183

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 184

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
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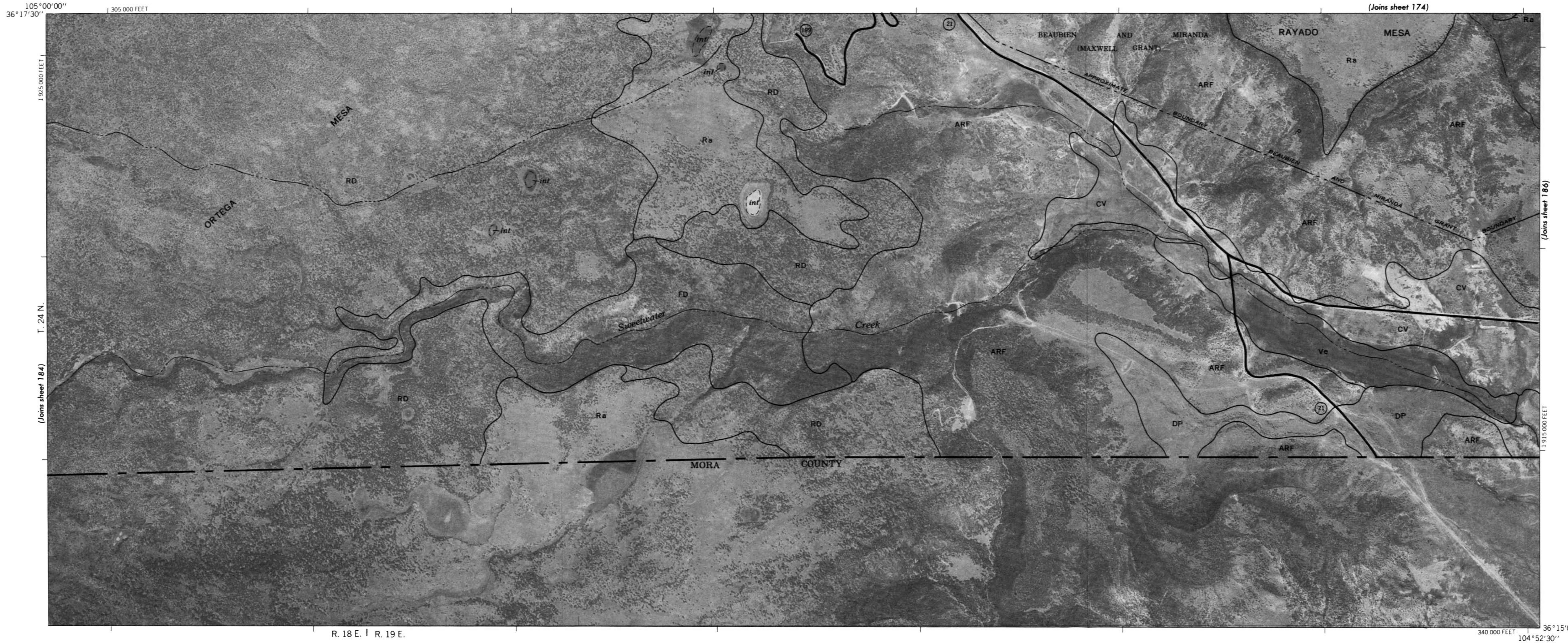
COLFAX COUNTY, NEW MEXICO NO. 184

185

N



COLFAX COUNTY, NEW MEXICO NO. 185

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
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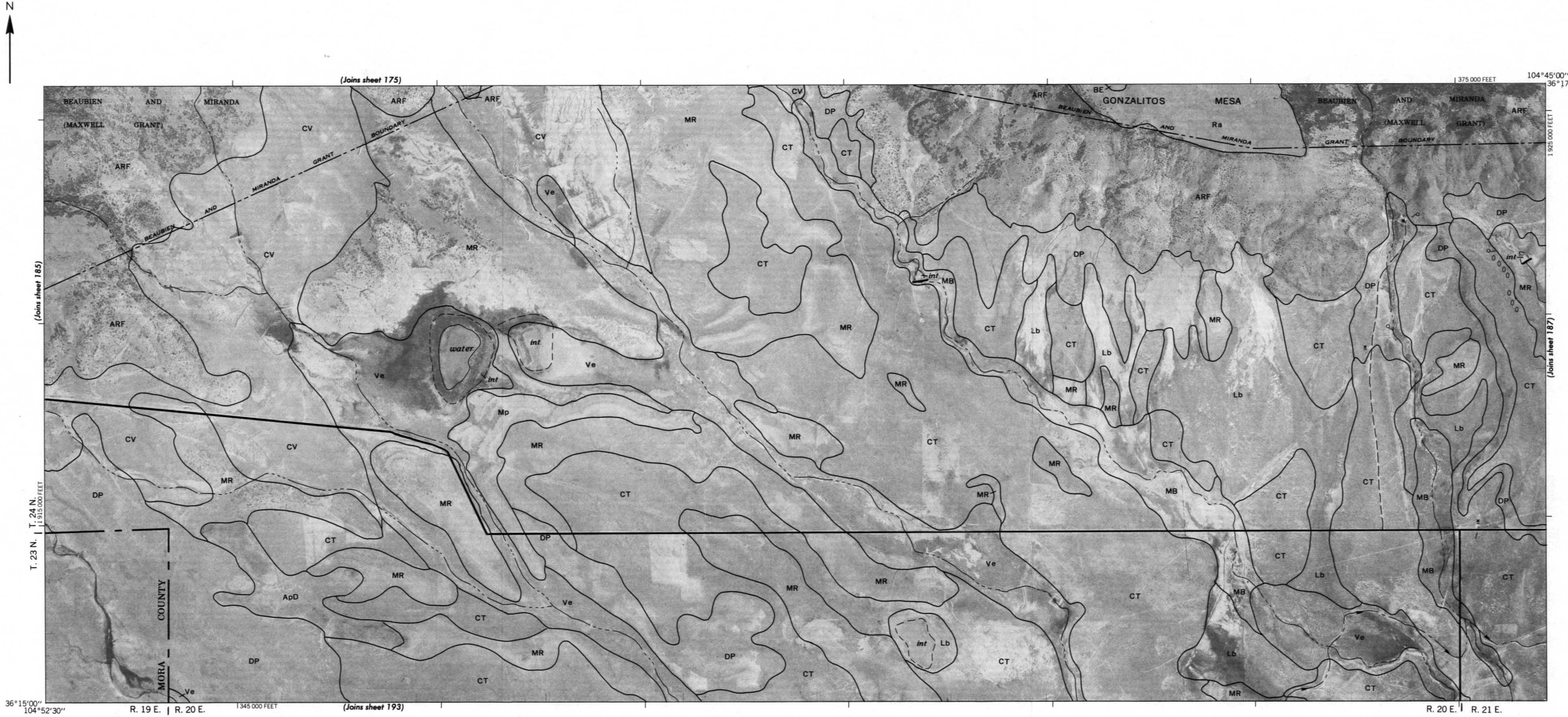
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 186



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.

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COLFAX COUNTY, NEW MEXICO NO. 186

N

COLFAX COUNTY, NEW MEXICO NO. 187

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

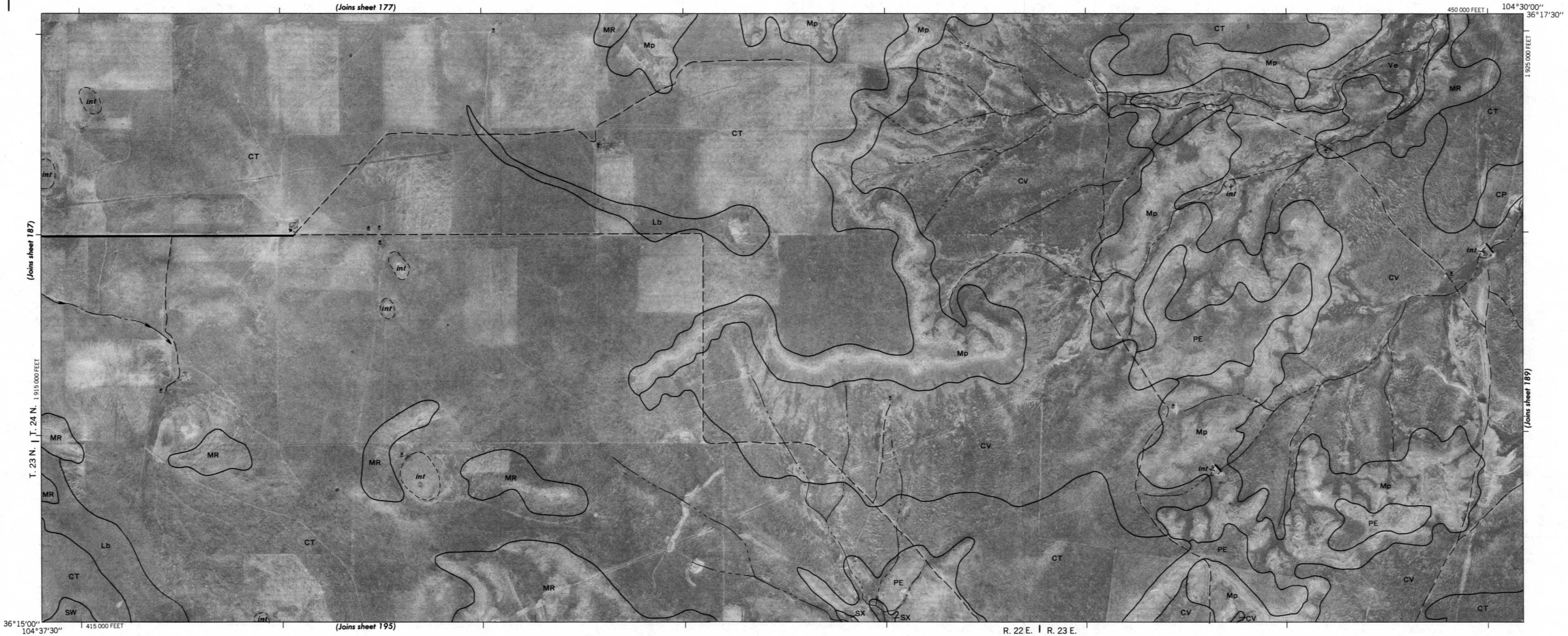
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 188



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
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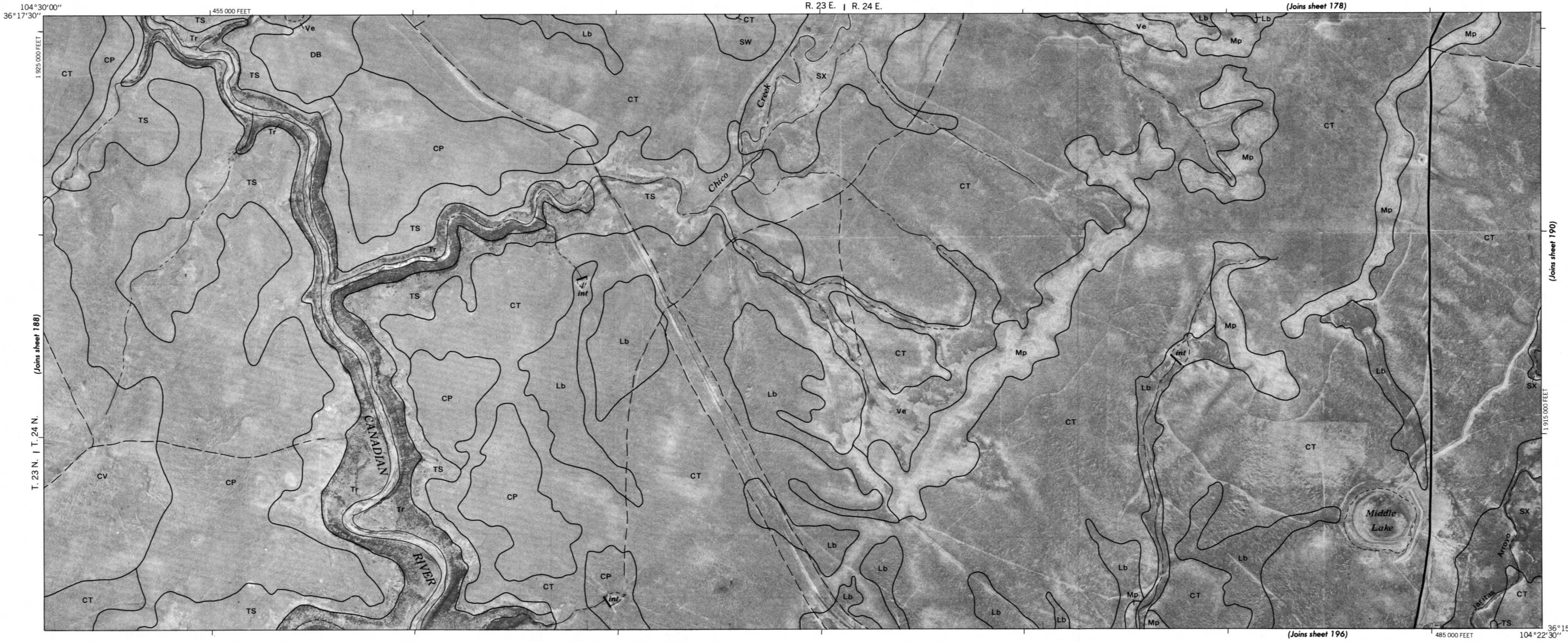
COLFAX COUNTY, NEW MEXICO NO. 188

189

N

COLFAX COUNTY, NEW MEXICO NO. 189

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



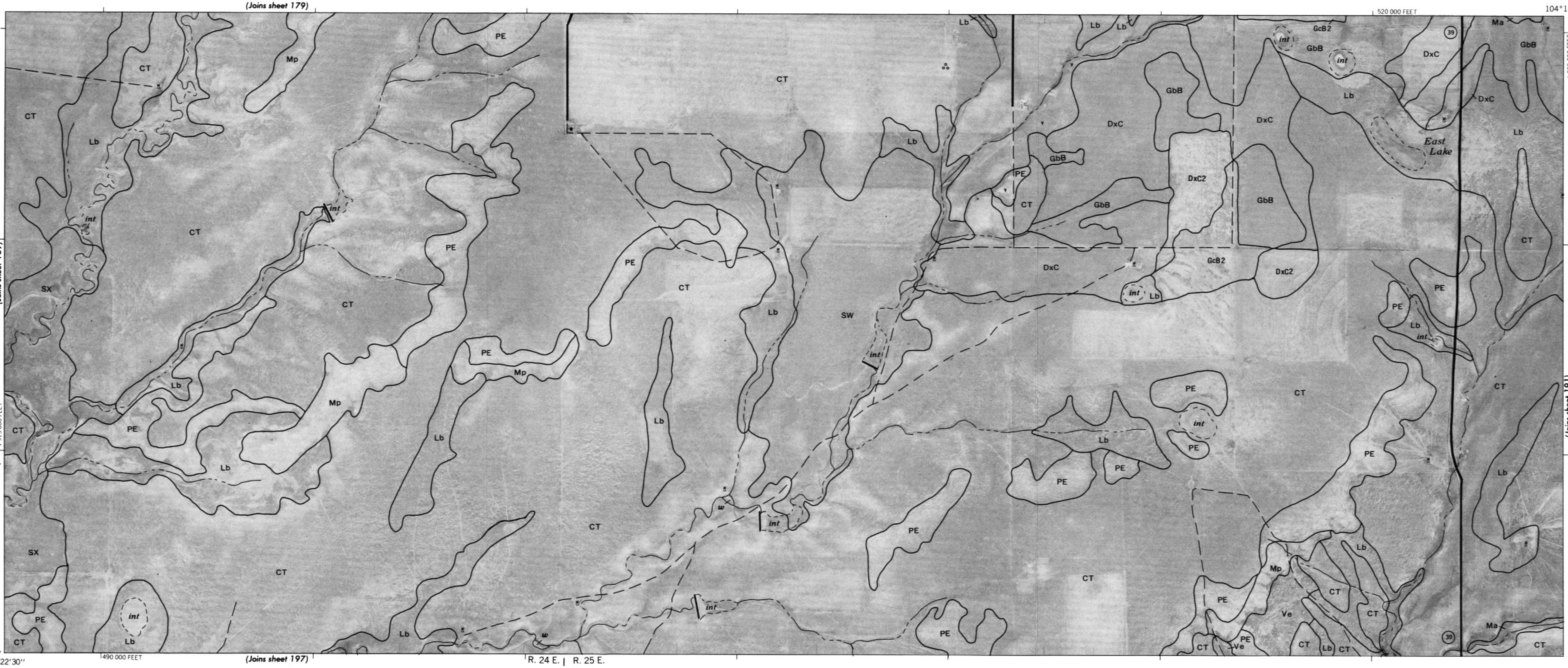
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 190



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography.
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191

N

COLFAX COUNTY, NEW MEXICO NO. 191

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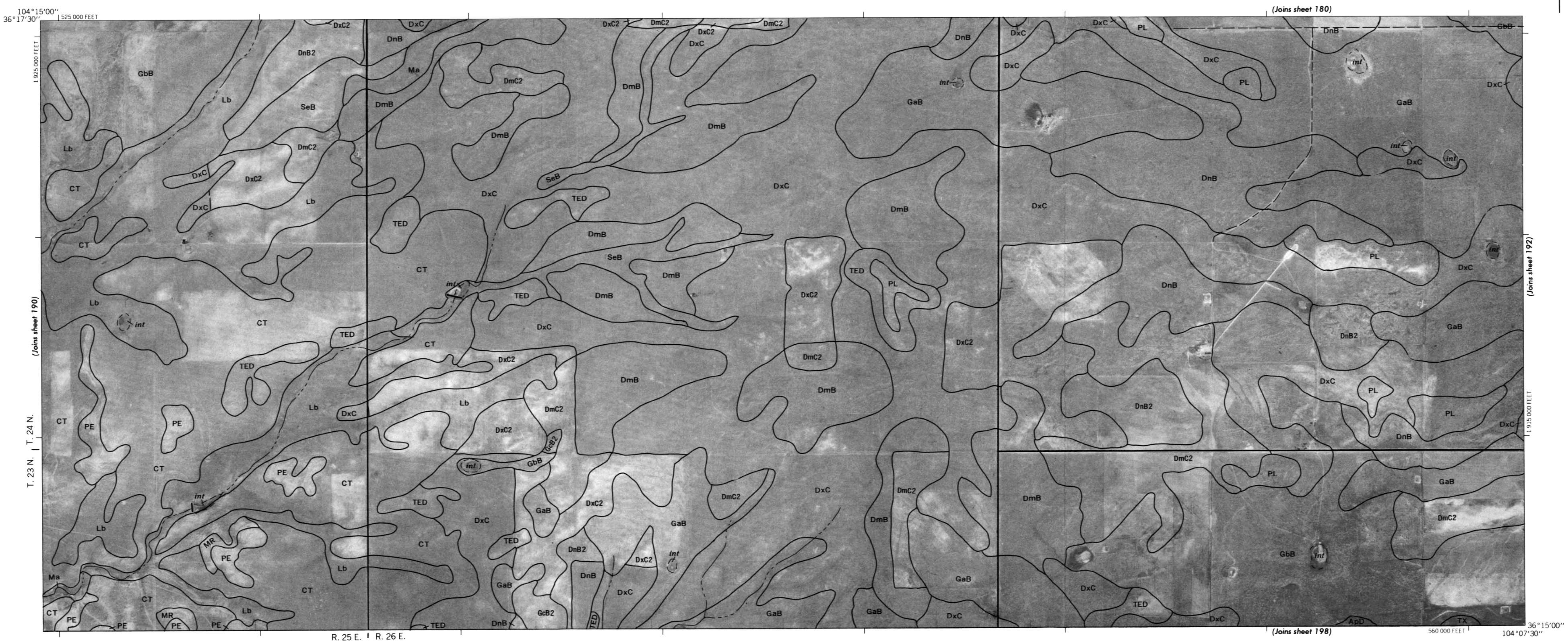


1 ¾ ½ ¼ 0 1 2 Miles

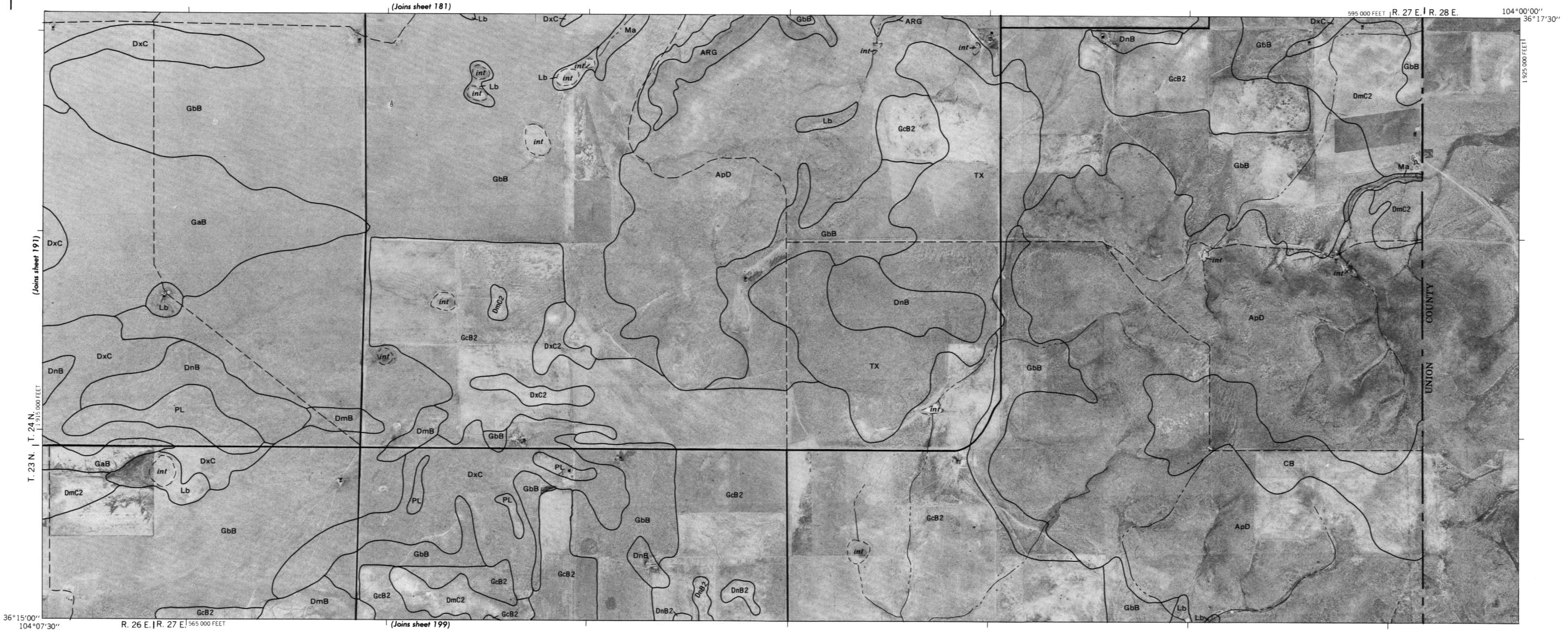
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

192

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 192

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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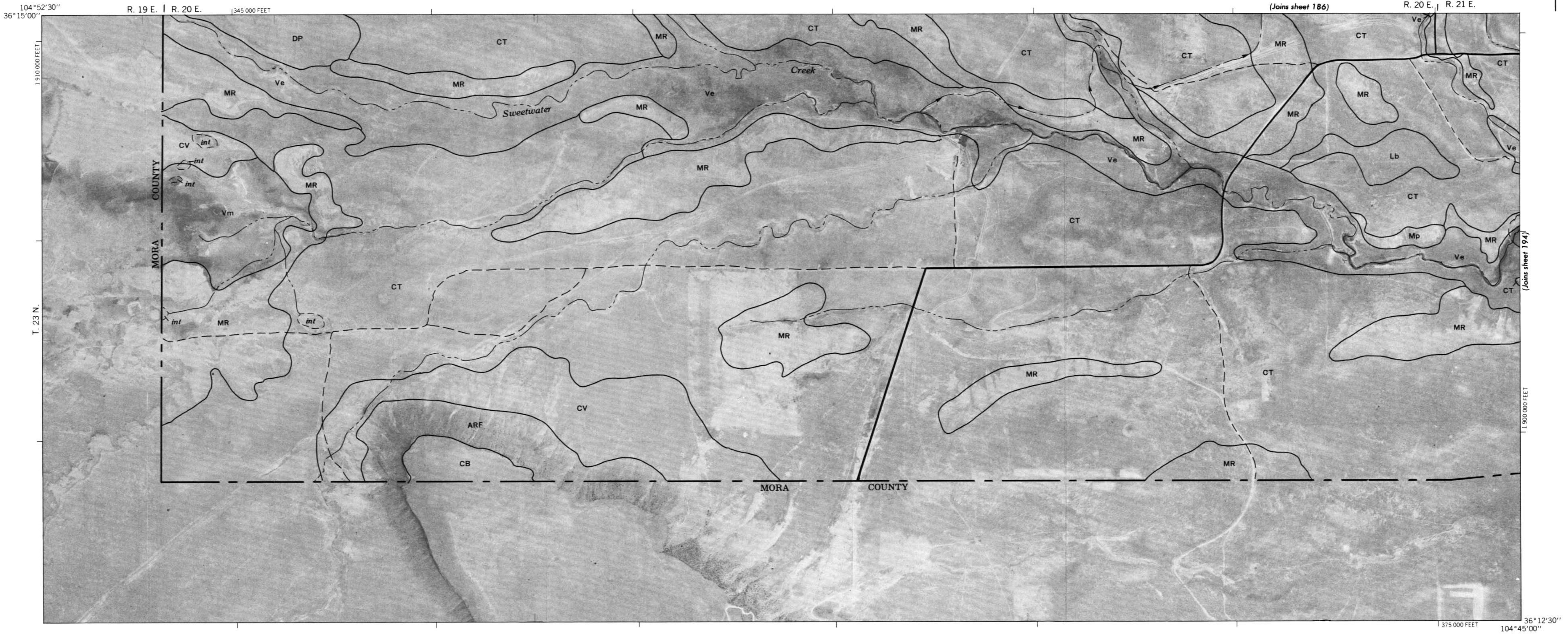
COLFAX COUNTY, NEW MEXICO NO. 192

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 193

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
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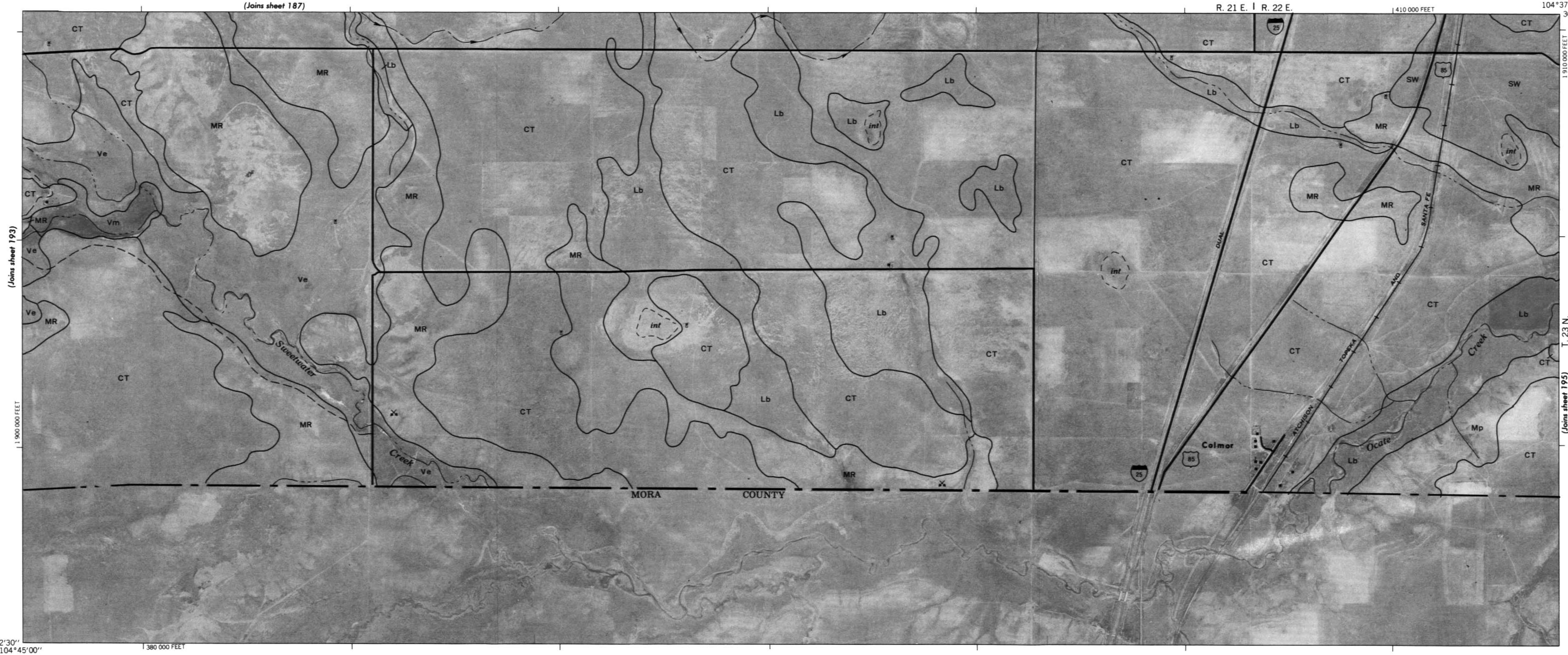
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 194

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

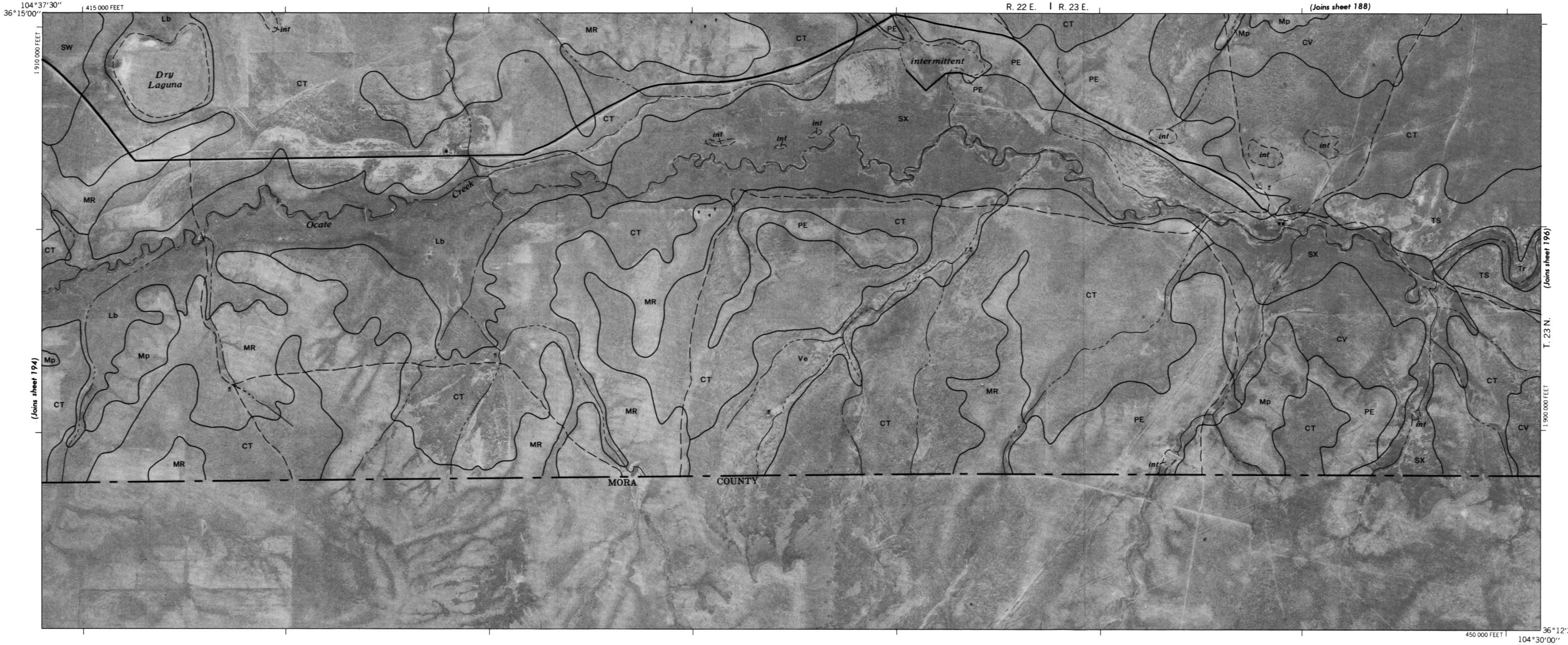
Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1978 aerial photography

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

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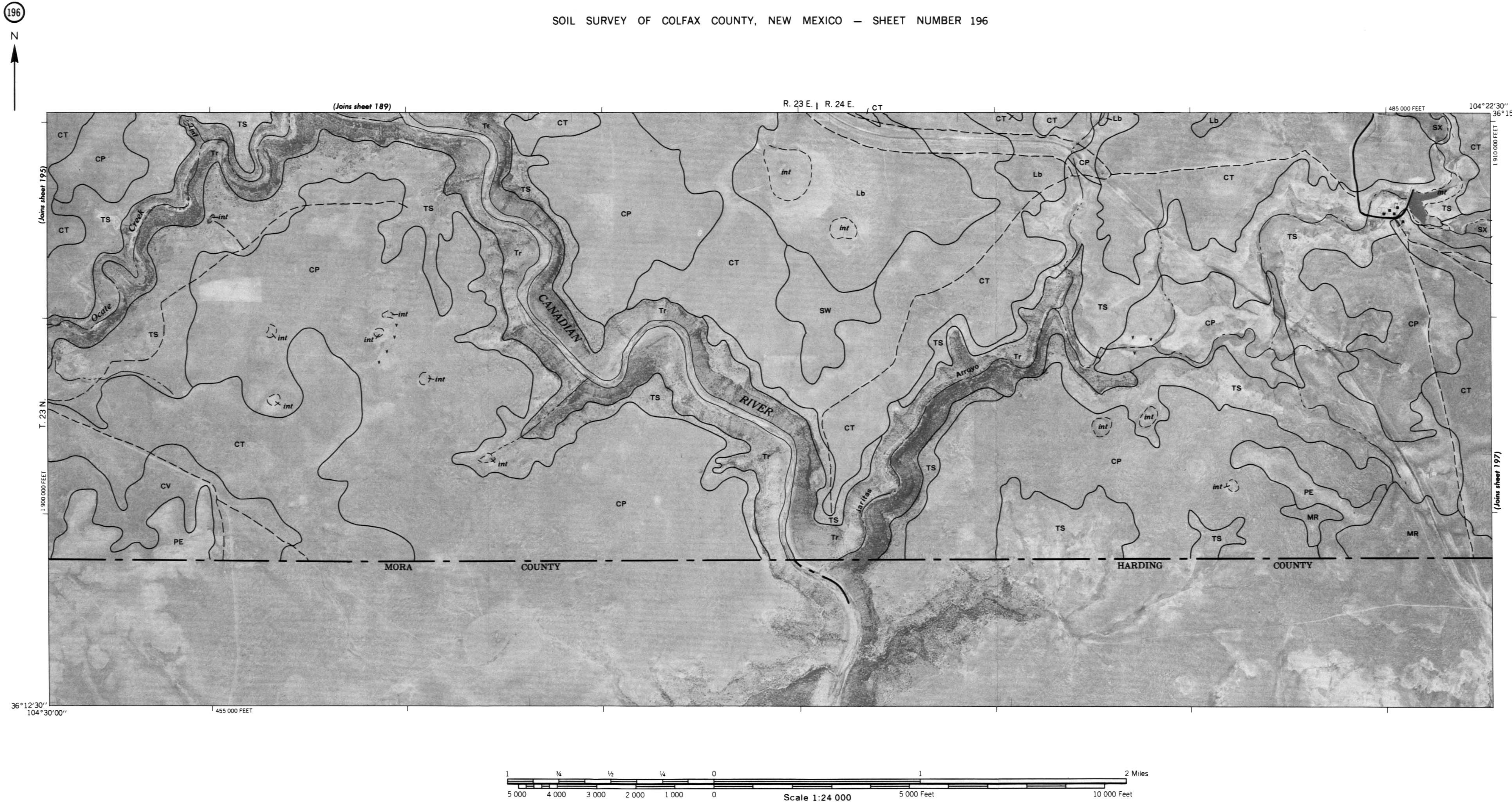
SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 196



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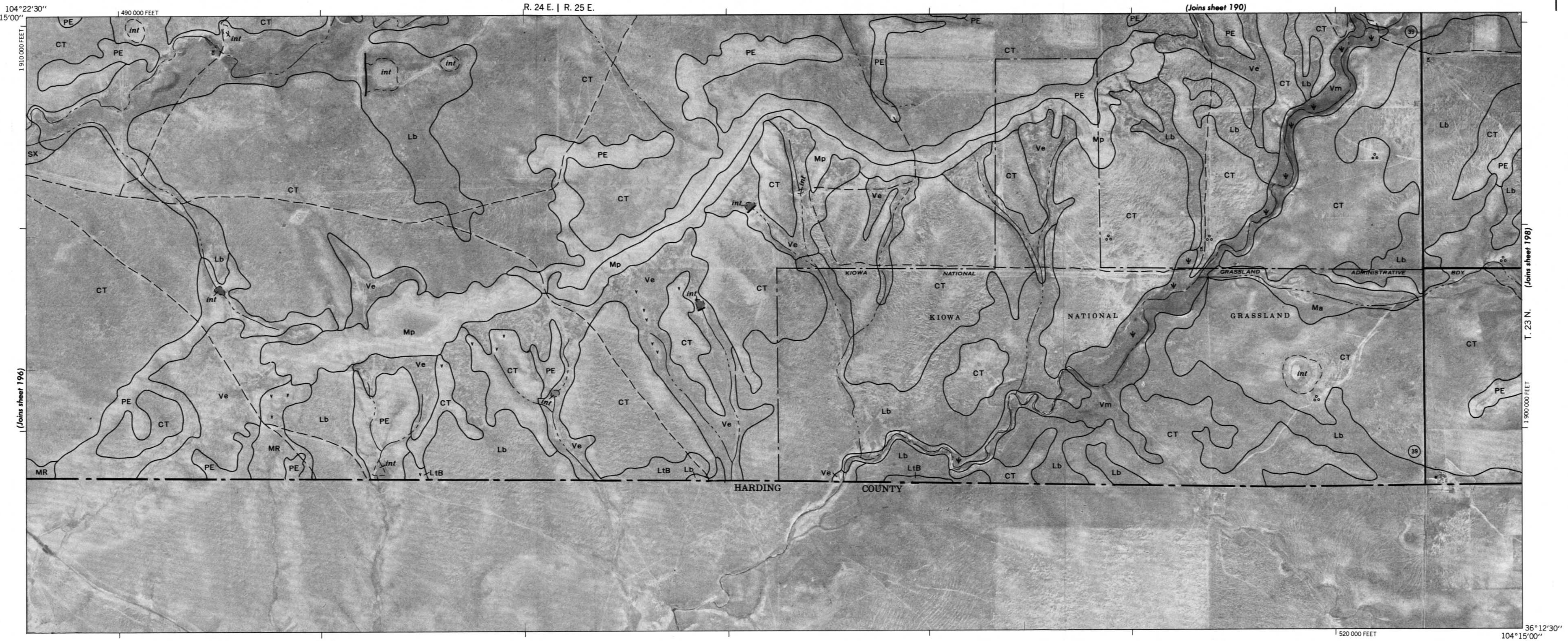
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

COLFAX COUNTY, NEW MEXICO NO. 197

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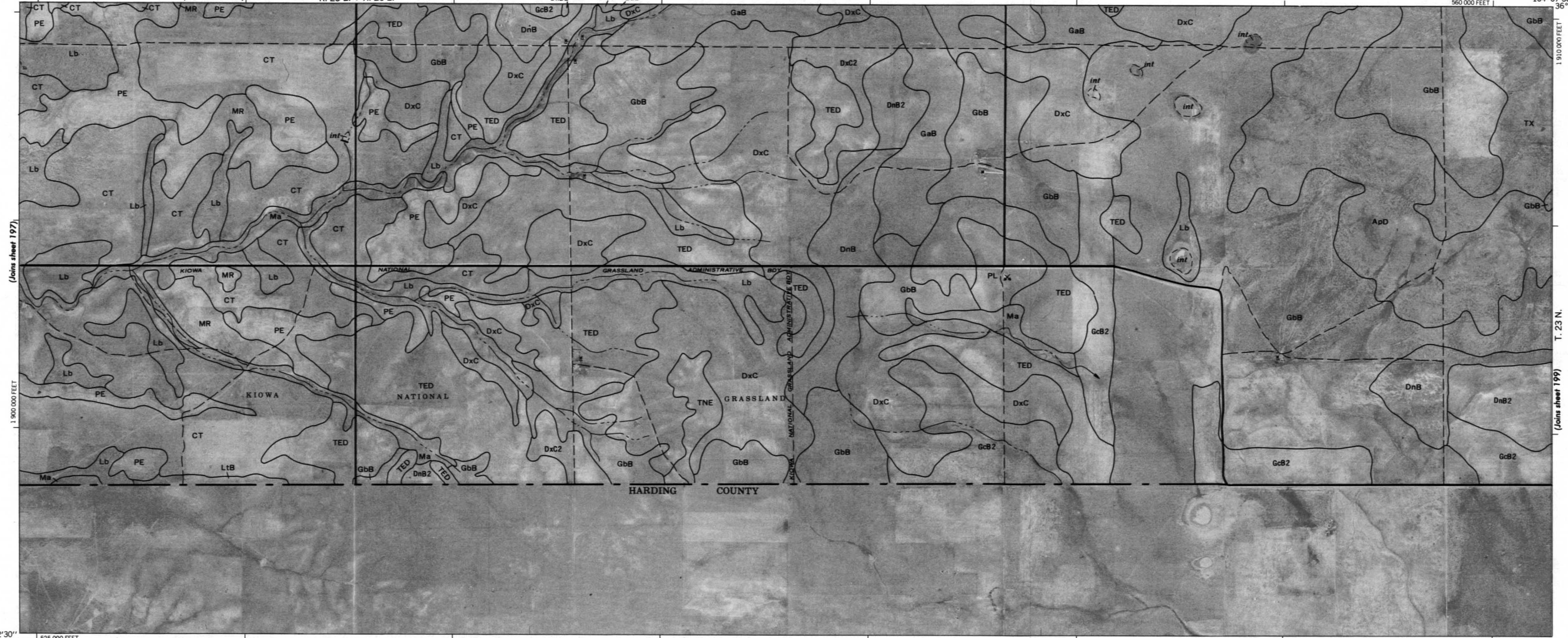
N

SOIL SURVEY OF COLFAX COUNTY, NEW MEXICO — SHEET NUMBER 198



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.
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199

COLFAX COUNTY, NEW MEXICO NO. 199

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